Senozon Via

User Manual
Version 1.6

senozon
understanding mobility

User Documentation for Senozon Via 1.6

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1 Getting Started

1.1 System Requirements

Operating System:

Windows: Senozon Via runs on Windows XP SP 3 or newer, including Windows 7 and Windows 8.

Linux: Senozon Via requires an existing installation of Java 7 or newer. Oracle's Java Runtime Environment (JRE) is recommended, which can be downloaded from `http://java.oracle.com/`. Please note that OpenJDK and GCJ are sadly known to cause problems when running Via on Linux.

Mac OS X: Senozon Via runs on Mac OS X 10.7.3 (Lion) or later.

Memory:
To run Senozon Via, make sure you have enough RAM. Small scenarios can usually be visualized with less than 1 GB of RAM. Typical scenarios with around 1 million agents can be run with around 3 GB of RAM.

1.2 Installation

The application does not require any special installation. You can just unzip the downloaded file and move the directory to whatever place you like (e.g. `Program Files` on Windows, or `/Applications/` on Mac OS X).

In the Linux distribution, a starter shell script is provided which can be used as the target of a symlink or for a custom launcher.

1.3 License

To run Senozon Via, you need a license file. When you start Via for the first time, the application will ask you for the license file, in order to fully setup and start the application. You can manage your license later at any point by selecting the menu entry `Help > License Manager…`.

1.4 First visualization

This section gives just a quick overview how to do some basic visualization with the sample data provided. See the following chapters for more details and a more extensive description of available functionality.

Start Via, and after the main window appears, choose `File > Add Data...`. Navigate to the sample data and select the file `network.xml`. Choose `File > Add Layer...` and click on `Network`. The just previously loaded file is suggested to be used, which is okay. Click on `Add` to add the network layer. The network should be shown in the visualization area and the network layer be listed next to it.

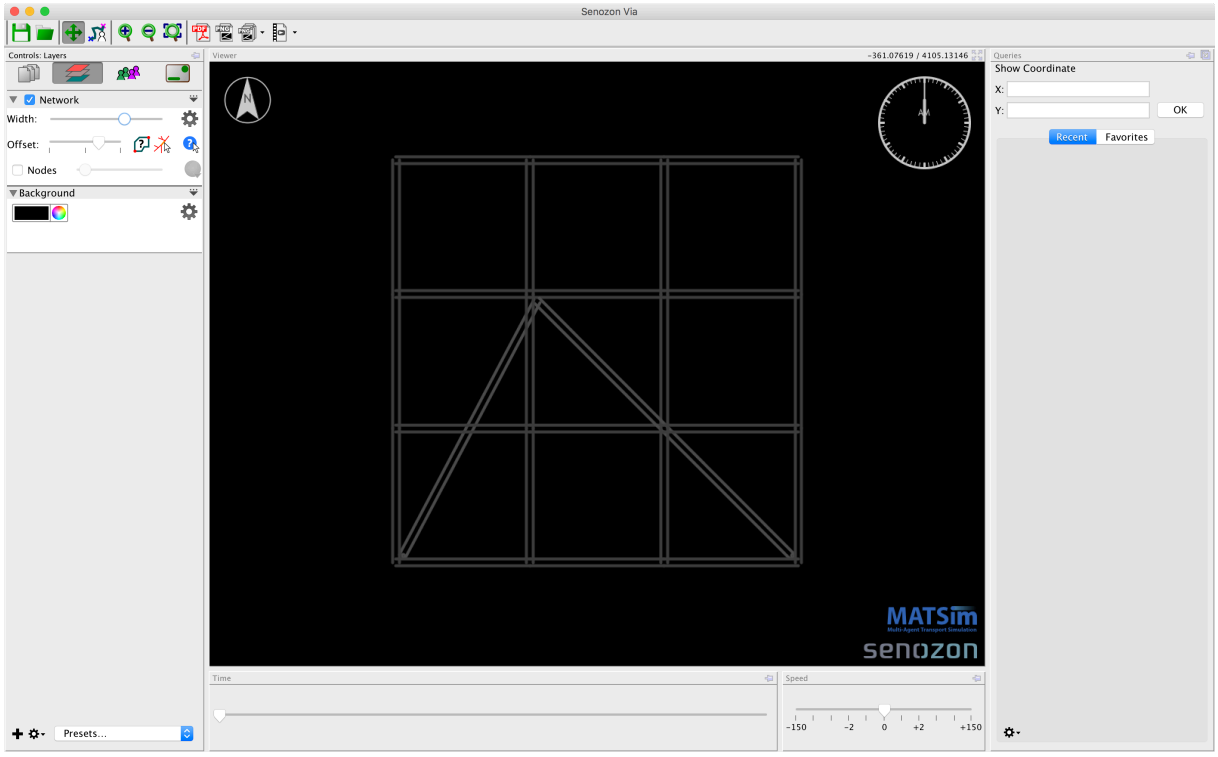


Figure 1.1: The main window, with the network layer added

Now let's add some vehicles to it. Again, choose `File > Add Data...` and select the file `10.events.xml.gz`. Then, add a Vehicles Layer (`File > Add Layer...`, select `Agents > Vehicles`, click `Add`). The vehicles layer will also be listed on the side of the visualization area. As event files can be rather large, they are not automatically parsed. Instead, layers that depend on events, show a button `Load Data` which must be clicked manually in order to parse the data from the events. Click this button to start the parsing of the events. Once this process is finished, a timeline appears beneath the visualization area. Move the slider to some point in time (e.g. to 8 o'clock) or move the speed slider next to it to animate the shown time. Soon you should see green triangles, representing vehicles, move around the network.

Play around with the `Size` and `Offset` sliders in the layers' settings area, and see which effect they have on the visualization. Fig. 1.2 gives you an impression how the visualization could look like after modifying those settings.

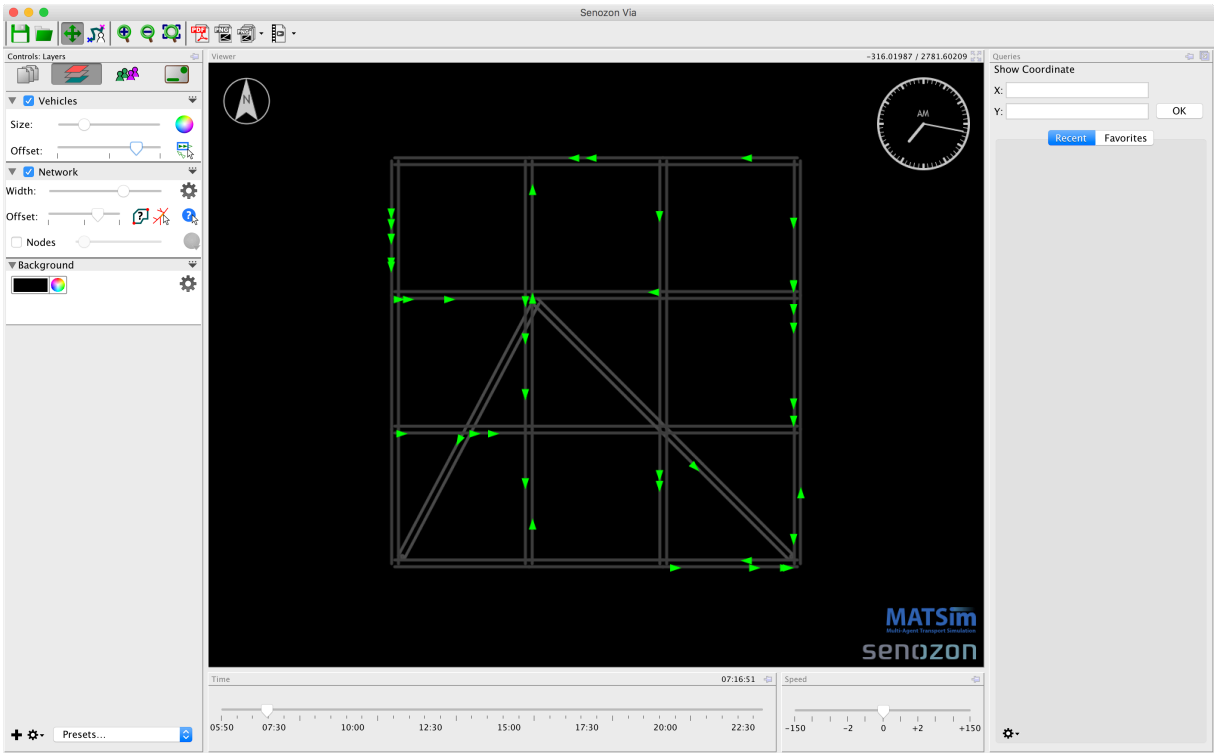


Figure 1.2: Network and Vehicles loaded and visualized

2 Application Overview

2.1 Main Window

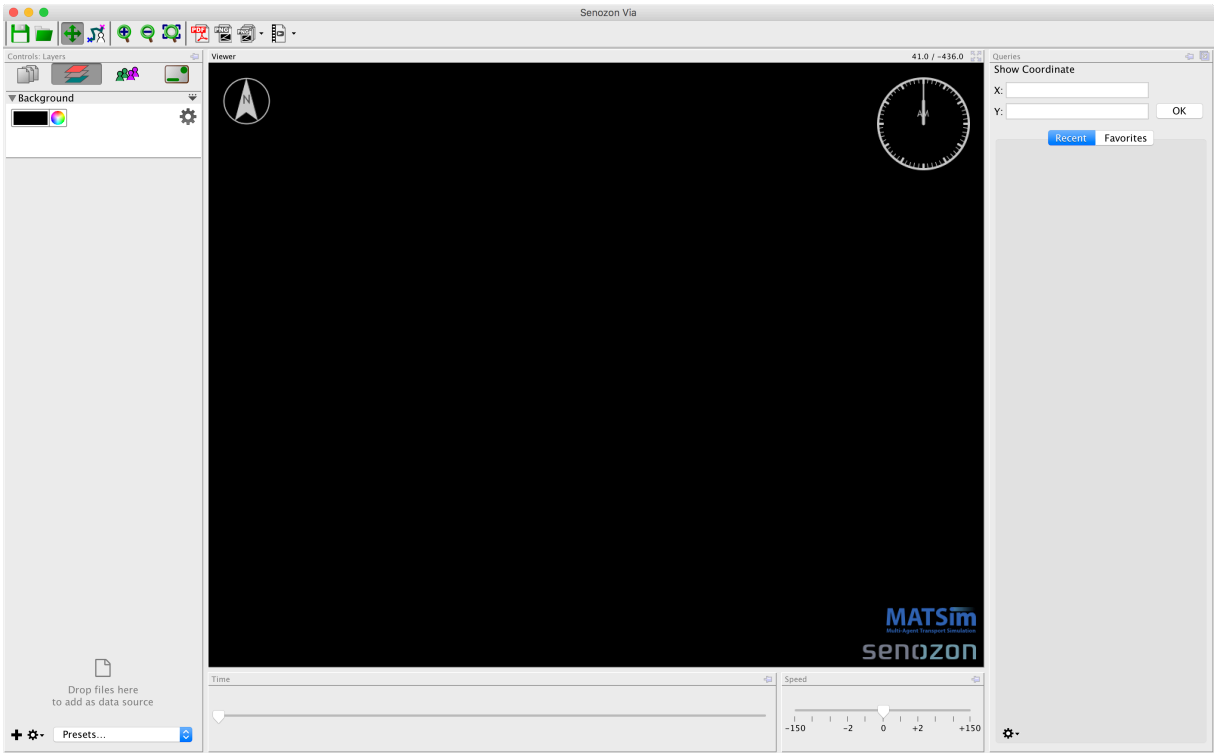


Figure 2.1: The main window

The main application window can be differentiated into the following areas:

Toolbar at the top of the window.
Visualization Area taking up most of the place, in the middle of the window.
Time and Speed Controls below the visualization area.
Control Section to manage the visualized data on the left side of the window.
Query Section on the right side to work with interactive queries.

All the parts can be freely re-arranged by drag and drop on the title bars of the parts. In case you want to restore the default arrangement of the components, select menu `Window > Reset Window State`. In the following, the main functionality of the different components will be described in more details.

2.2 Toolbar

Figure 2.2: The Toolbar

The actual buttons on the toolbar depend on the available plugins. The buttons shown in Fig. 2.2 are standard buttons and available in all installations:

Save Save the currently loaded data to a file. This stores all data required for displaying the loaded layers in a file, together with the current display configuration (colors, sizes, etc). The filename of such files ends on ".via". Note: Storing big data sets can take several minutes.
Open Loads the data from a previously saved file. Any already loaded layers will be removed.
Mouse for Moving If active, the mouse pointer can be used to move the visualized region.
Agent Plan Query Activates the agent plan query (see Sec. 4.2).
Zoom In, Zoom Out, Zoom to Full Extent Zooming functionality
PDF-Export Takes a single PDF-Snapshot of the display area. Note: Taking a PDF-snapshot can take some time on complex visualizations with many agents being shown.
Screenshot-Recording If activated, constantly saves screenshots of the visualization area. The location where the screenshots are saved can be configured in the application's options.
Single Screenshot Saves the current display as a bitmap image.

2.3 Visualization Area

The visualization area covers the biggest part of the main window. Here, your network, vehicles and other data will be visualized. Which data is visualized is controlled by the Layers Control (see Sec. 2.5). You can navigate in the visualization area by clicking and dragging the area with your mouse while the corresponding functionality is activated in the toolbar. When some other query tool is activated, use the middle mouse button to drag the visualization area, or switch back to the regular mouse functionality by clicking on in the toolbar. To zoom in or out, you can either use the corresponding buttons in the toolbar, or use the scroll wheel on your mouse.

2.4 Time and Speed Controls

Below the visualization area, you find two sliders: The first controls the current time shown, while the second controls how quick the time advances in the visualization.

Directly after starting Via, the time slider does not show any indication of time. Only after loading some time-dependent data and visualizing it by adding corresponding layers will the slider display the range of time for which data is available. You can customize the shown range of time by using the Menu `Time > Set Custom Time Range...`. The `Time` menu also offers several commands to control which point in time is visualized.

2.5 Control Section

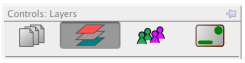


Figure 2.3: Control Switches

In the control sections, various settings for controlling the visual appearance or the available data are presented. The controls are organized into four groups, which can be switched by clicking on the different icons:

Data Sources Add data files (e.g. network.xml, events.xml.gz, zones.shp) to the application to make them available for visualization. Either click on the green plus-button at the bottom of the area, or just drag and drop files into the area to add them.

Layers Add and manage "layers", visual representations of loaded data. Each layer is typically responsible for displaying one aspect of the data (e.g. the network, vehicles, activities, one shape file).

Agent / ID Groups Manage sets of agent ids, which can be used by layers to customize the visualization. For an example, see Sec. 11.2.

Overlays Manage the appearance of overlays over the visualization area, like the clock shown in the top-right corner.

2.6 Query Section

One of Via's strength is its wide range of analyses it offers. Most of the analyses start by querying one of the visualized objects, e.g. a vehicle, a transit stop, a facility. Based on such a selection, additional queries are possible, e.g. the lines serving a transit stop, the number of persons in a facility. All these queries and their results are available in the query section. Chpt. 4 looks at the available queries in more detail. In addition, the chapters about the different plugins (e.g. Chpt. 5 for the Public Transport plugin) also refer to the queries provided by the respective plugin.

3 Visualizing Data

Data visualized in Via is organized by layers. Each layer is responsible for visualizing one data set. Thus, Via provides layers for visalizing networks, facilities, agents' activities and trips, public transport stops, or just generic points in space.

3.1 Working with Layers

3.1.1 Creating Layers

To create a new layer, make sure that the needed data is available and loaded into the application. Then, switch to the Layers Control and click the green plus-button at the bottom of the panel, or choose `File > Add Layer...` from the menu.

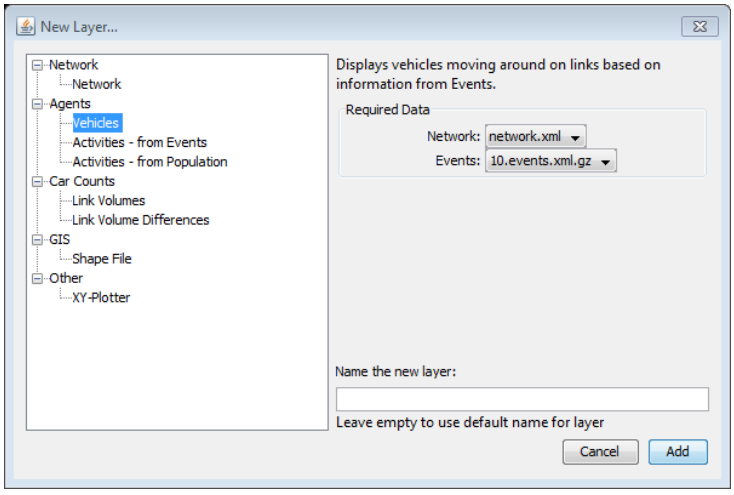


Figure 3.1: Creating a new layer for visualizing data

Once a layer is created, it will appear in the list of layers, along with settings offered by the layer. Layers can by hidden by unticking the checkbox in front of the layer name. The order of the layers can be changed by clicking in the area next to the layer name and dragging the layer up or down in the list of all layers.

On the right end of the layer's title bar, a triangle icon offers additional options to work with a layer in a popup. By default, options to rename or remove a layer are available. Certain layers provide additional functionality in this place as well, such as the network layer depicted.

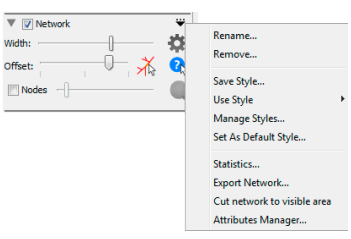


Figure 3.2: A layer with settings, and the layer options opened.

3.1.2 Create Layers Automatically

The typical process to visualize some data consists of at least two steps: Add the necessary data file, then create a layer using this data to show something. This can be simplified by instructing Via to automatically create certain layers when specific kinds of data is loaded.

Switch to the Data Sources control (first button in the control section). At the bottom, you'll see a little gear icon. Click on it and select `Automatically Create Layers...`. A dialog will open where you can select which layers should be automatically created.

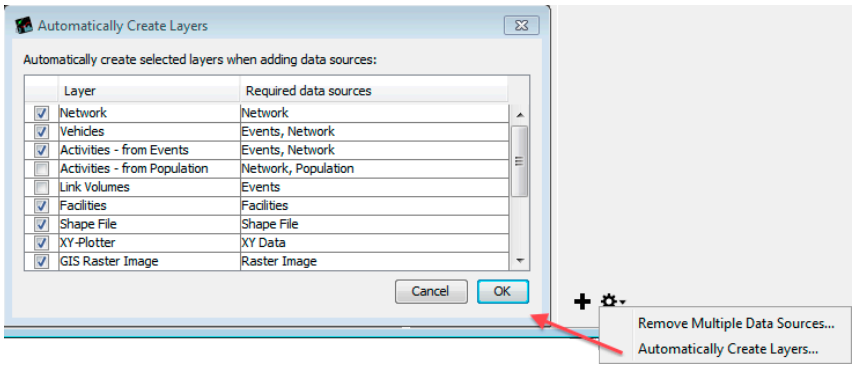


Figure 3.3: Automatically create new layers when adding data

Please note that when you are adding multiple data files of the same type (e.g. multiple networks and multiple event files), Via might not create certain layers due to the ambiguity of which files to combine (e.g. which network and which events to create a Vehicles layer).

3.1.3 Layer Styles

Most layers include options to change the visual appearance of the shown data. This is great as depending on the zoom level, different settings might be helpful: Looking at a small detail of a road network, it might be desireable to have the links shown with a heavy stroke and some offset, but looking at the full network, a thin stroke and no offset often looks better. If you often change between two or more zoom levels, keeping track of all the right settings is very cumbersome. Styles help to store the state of the visualization options, so it is easy to switch between two or more visual setups with ease. Styles are saved in `*.via` files, so they can also be used to define presets to be used during a presentation, e.g. along with Views (see Sec. 3.3).

To access the styles option of a layer, open its option menu. If the layer supports styles, you'll see the entries `Save Style...`, `Use Style`, `Manage Styles...`, `Set As Default Style...`. To save the current visualization options of this layer as a style, just select `Save Style...` and enter a name. The style will then appear in the sub-menu of `Use Style`, where it can be selected. If you have a corporate appearance, or prefer other defaults than Via's developers, you can define your own default style for this layer by selecting `Set As Default Style`. Then, all new layers of this type will use your current settings.

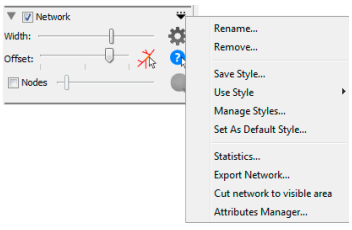


Figure 3.4: Access to the styles for a layer.

With `Manage Styles...` you can delete styles, restore the application default style, and define styles as being global. By default, styles are related to the current visualization, and are stored in `*.via` files. But if you want some styles available all the time, no matter what data you are visualizing, you can define those styles as global using the `Manage Styles...` dialog. A global style is stored locally with the applications options, so every time you start Via on this machine, the style will be available under `Use Style`.

3.2 Layers

In the following sections, the layers available by a default installation of Via are described. Plugins can add additional layers, which are described in their own sections.

3.2.1 Network

Displays a network.
Requires a loaded network file.

Using the settings, it is possible to offset links either to the left or the right such that the links in opposing directions are not drawn on top of each other.

The colors and width of links can be modified by clicking on the gearwheel (options) icon. It is possible to assign different colors to links with different allowed modes, different number of lanes, different capcacity and other attributes. Also, one can display links with different width depending on links' attributes (allowed modes, number of lanes, and others). When setting the values based on allowed modes and a link should match multiple modes, separate the various modes with a comma. If a link should match having at least one specific mode, enclose the mode with asterisks ("*"). The color of a link is determined by the first (top-most) mode-description that matches the links' transport modes.

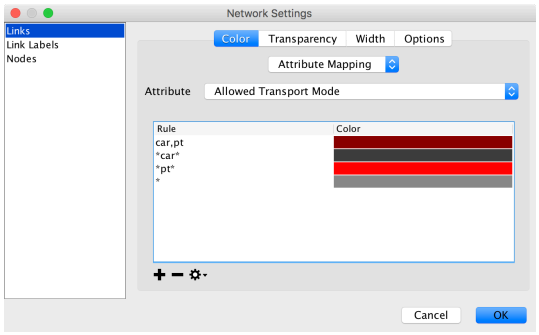


Figure 3.5: Setting the colors and width of links in a network

The list of attributes available to set the appearance of links in the network can be extended with additional attributes loaded from a variaty of files. Supported files are MATSim's Object Attributes saved as XML file, tab-separated text files, or CSV files. To load additional attributes, click on the small triangle in the layer settings (see Fig. 3.2) and select `Attributes Manager...`.

3.2.2 Vehicles

Displays vehicles at their current position in the network.
Requires a loaded network file and an events or population file.

The vehicles layer displays the position of vehicles in the network. The vehicles can be colored based on a number of attributes, including absolute or relative speed (relative to the links' free speed). To change the display style of vehicles, click on the color wheel icon. A dialog as in Fig. 3.6 will show where the color and the style of the vehicles can be set. It is even possible to have different styles for different groups of vehicles. Sec. 11.2 explains in detail how this can be done.

If you have the FancyVehicles plugin, you can define your own display styles given the options available in the FancyVehicles' settings available in the `Tools` menu.

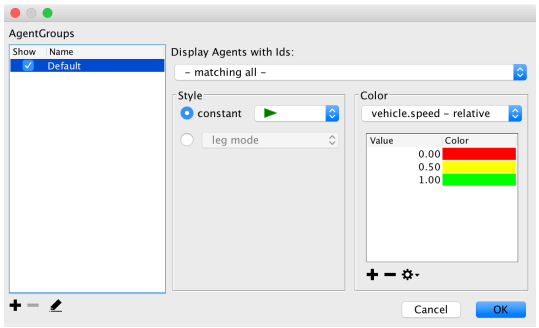


Figure 3.6: Setting the styles for vehicles

Other layers (e.g. TransitStats) or data sources can provide additional attributes that can be used to color agents, for example the number of passengers, or agent-attributes from a population file.

3.2.3 Activities

Displays the locations where agents are currently performing an activity.
Requires a loaded network file and an events or population file.

The activity layer displays a colored dot at each location where an agent is currently located, performing an activity. Different types of activities can be visualized with different colors. To create an activity layer, you have two possibilities:

- Load the activity data from events. The location (based on link ids) and the start and end time of activities are retrieved from events.
- Load the activity data from population. The location (link id or, if given, the exact coordinate) as well as the start and end time of activities are extracted from a plans file.

Only one of the two sources (events, or population) can be used to create an activities layer. If you want the actual activity times from events, but want to use the exact location as given in a plans file, follow the steps outline in Sec. 11.3.

Each activity type can be shown in a different color. To setup the colors, click on the color wheel icon. Then, assign colors to the different activity types. To add a new activity type, click the "+" icon. Note that you can use an asterisk as wildcard character to match multiple, similar activity types and assign them one common color. To learn what activity types actually occur in the data, click on the little gearwheel icon and select `Find attributs...`. A list of all activity types found in the loaded data will be shown, along with the color in which they would currenctly be displayed.

Please note that the Activities Layer may slow down the visualization enormously if a large number of agents is shown.

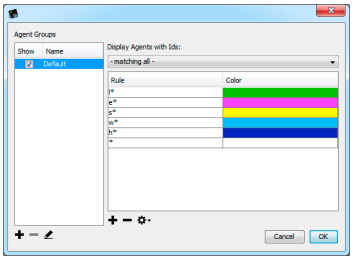


Figure 3.7: Setting the colors for different activity types

3.2.4 Facilities

Displays the locations of facilities.
Requires a loaded facilities file.

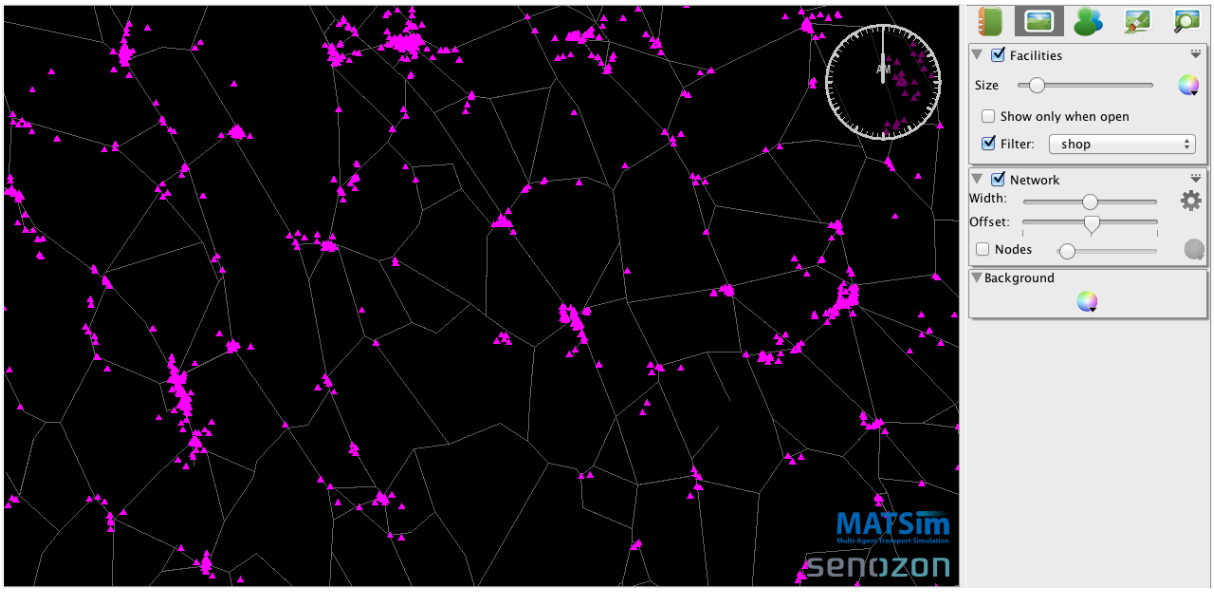


Figure 3.8: Home facilities displayed over a planning network

Facilities are an optional dataset in MATSim, which are often used to model location choice or are also used during the initial demand modeling. Displayed facilities can be filtered by activity type, so only facilities that offer a specific activity type are shown. In addition, facilities can be displayed only when the facility is

opened, according to the opening times defined in facilities. If the facilities are filtered, the opening time of the filtered activity type is used, otherwise a facility is displayed if at least one of its activity options is open.

3.2.5 Dynamic Link Attributes

Displays traffic volumes or average link speeds by coloring the links in the network.
Requires a loaded network file and an events file.

This layer calculates two time-dynamic values for each link: (a) traffic volume (number of vehicles passing a link), (b) average speed on a linkk. This information is then provided as additional attributes to the Network, such that link volumes and link speeds can be selected as an attribute to display the network. Both attributes can be aggregated to different time windows, link volumes provided to the network are always scaled to hourly values. This has the advantage that the assigned color ramp does not have to be adapted if the aggregation level is changed.

Absolute and relative link volumes are provided:

Absolute link volumes are the actual number of vehicles counted per link.
Relative link volumes are values between 0.0 and 1.0 corresponding to the amount of vehicles compared to the available capacity of the link.

Note: This layer was originally called "Link Volumes"

3.2.6 Difference Network

Displays the absolute or relative difference between two link attributes (from the same or different networks).
Requires one or two loaded networks.

This layer allows to calculate the absolute or relative difference of two attributes. The attributes can be from the same or from two different networks, and the attributes can be scaled, e.g. to compare link volumes between two different sample scenarios.

3.2.7 Link Volume Differences

Displays absolute or relative difference between two link volume data sets.
Requires a loaded network file and two events files.

Note: This layer is the predecessor of the Difference Network Layer and will be remove in a later version.
This layer calculates the difference of two link volume data sets, useful to show differences in two scenarios. This allows you to load two Link Volume layers based on two different events files, one e.g. being a base case and the second one a case study. The calculated difference is provided as additional attribute to the Network. To display the link volume differences, one has thus to select the corresponding attribute in the Network display settings.

The difference can be computed in three different ways, one named "absolute difference", and two variants for the "relative difference". Make sure to select your preferred variant for the relative difference in the layer settings.

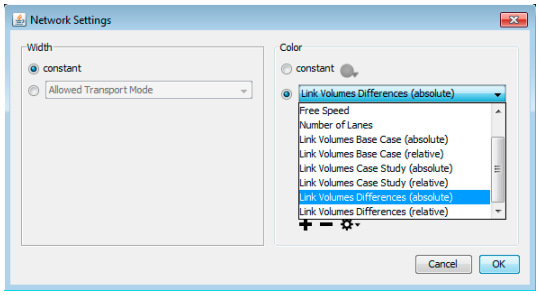


Figure 3.9: Selecting the right attribute for displaying a network

The meaning of the three alternatives are:

Absolute: the difference between the absolute link volumes of the two cases.

Relative: Relative diff. of B to A : The difference between the two link volumes per link is set in relation to the link volume of the first one.
Relative: abs. diff. of rel. volumes : The absolute difference between the two relative link volumes.

To clarify the matter, consider the following example: A link in the network has a defined capacity of 2000 veh/h. In the base case, 1500 veh/h were counted. In the study case, 1000 veh/h are counted.

- The absolute difference would be calculated as 1000 – 1500, resulting in an absolute difference of –500 veh/h.
- The first relative difference is calculated as (1000 – 1500) / 1500, resulting in –0.33. This can be interpreted as having 33% less traffic in the study case than in the base case.
- The second relative difference is calculated as (1000 / 2000) - (1500 / 2000), resulting in –0.25, or 25% less capacity of the link used.

3.2.8 Shape File

Displays arbitrary shape files, e.g. for background maps.
Requires a loaded shape file.

Figure 3.10: Options for Shape Files

This layer allows one to visualize shape files (points, line and areas are supported). First, load a shape file as data source, then create a layer for it. If the shape file is shown in the wrong place, or even rotated, change the options in the data sources view. First, make sure the shape file is in the correct coordinate reference system (CRS). Next, if the shape file appears to be rotated and squeezed, select the checkbox "Use Long/Lat instead of Lat/Long". This is due the fact that shape files (or more exactly: coordinate systems) do not specify if the first coordinate is the longitude or the latitude. The list of available coordinate reference systems can be adapted in Via's options (menu `File > Options...` on Windows and Linux, `Via > Preferences...` on Mac OS X).

In the layer's option menu (the triangle on the right side of the layer's title), Shape layers offer the option to display a shape file only during a specific time window. This can be used e.g. to highlight areas in a time-dependent manner.

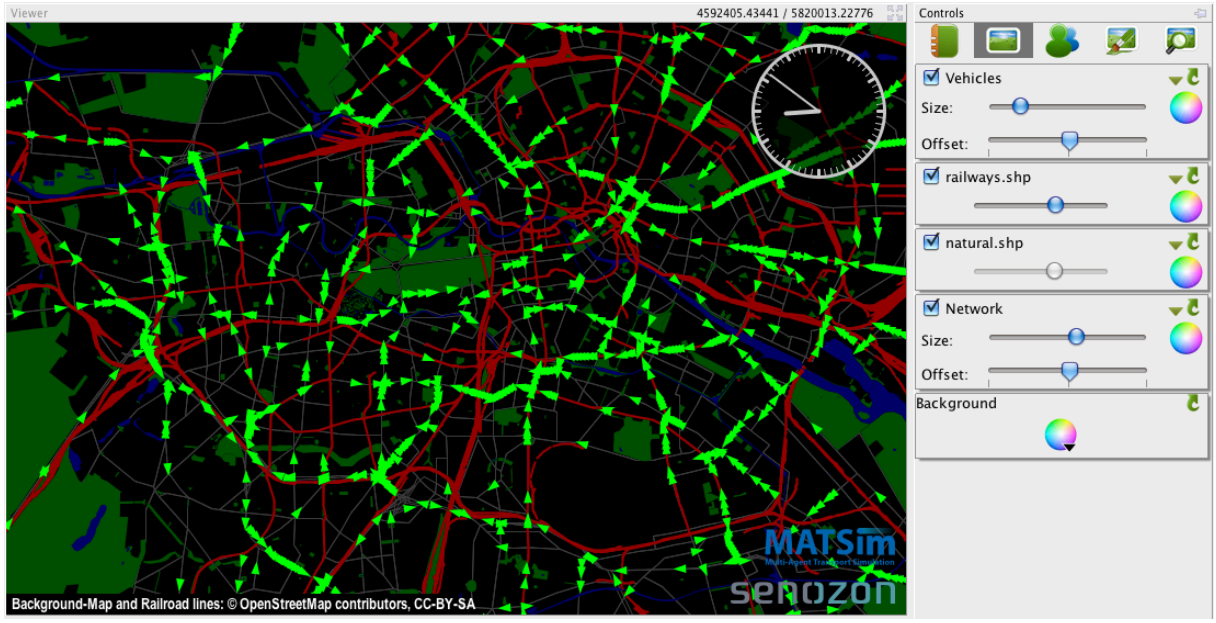


Figure 3.11: Two Shape file layers added for visualizing nature and railroad tracks

3.2.9 XY-Plotter

Displays colored dots at coordinates specified in a file
Requires a file containing coordinates and attributes (see below)

The XY-Plotter plots dots at specific locations given in a file. This layer is mostly useful to quickly test some data before or after conversion from other formats. Just dump some coordinate values into a file and have a look if their distribution makes visually sense and is what you expected.

A variety of file formats are supported:

.xy, .txt Text files ending on `.xy` were traditionally the only format supported by Via. By now, the files can also end on `.txt`. Such files must contain at least two columns of data, separated with a tab. The first column contains usually the x-coordinate, while the second contains the y-coordinate. Attributes can be included in additional columns.

.csv CSV (Comma separated values) files can often be created by spreadsheet applications. Each attribute, including x- and y-coordinates, should be stored in a separate column. Via[] supports CSV files which use comma or semicolon as field separator.

.gpx GPS devices often record points in GPX files. Via can load GPX files and extract the coordinates from recorded tracks and waypoints.

In the full version of Via, the layer offers a lot more functionality and supports additional attributes for each data point. When adding an xy data source, a dialog containing import options can be shown by clicking the corresponding button in the data sources view. In the dialog, attributes can be selected that should be imported, the name and data type can be specified for each attribute, and it can be specified with columns contain the X and Y values.

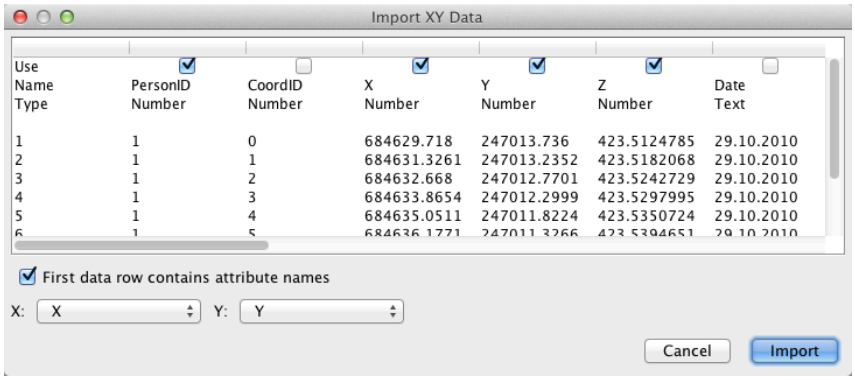


Figure 3.12: Settings for importing XY data

The layer settings offer a lot of functionality to work with the additional attributes. For example, it is possible to color the points based on an attribute's value, or change the symbol or the size of the dot according to an attribute's value. In addition, points can be displayed only during a specific time window, also based on attributes. If some of the points form a logical group, e.g. points from a GPS track of a single person, and group membership is available in an attribute, it is even possible to interpolate the location of time-dependent points along the time of day.

3.2.10 Image

Displays arbitrary images at custom defined locations
Requires a loaded image file

This layer allows to display custom images at fixed locations on the screen. It can be used to show custom backgrounds images or logos.

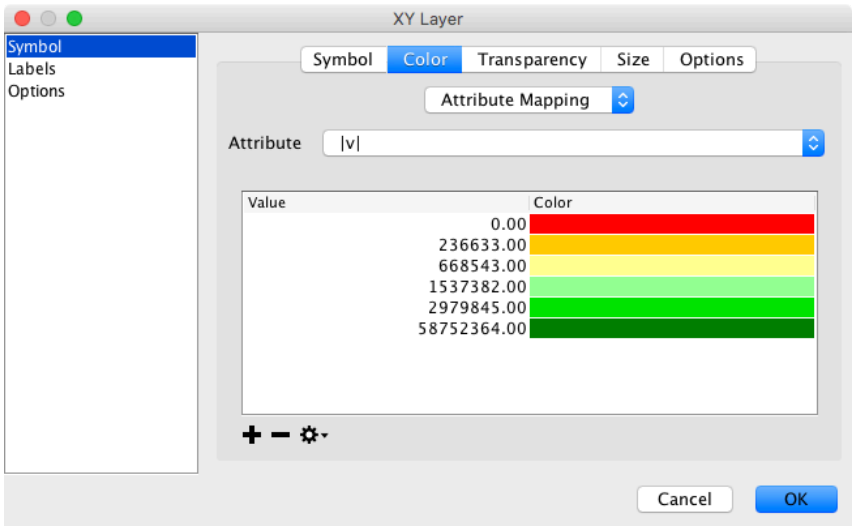


Figure 3.13: Settings for displaying XY data

3.3 Views

Do you prepare for a presentation or a movie recording, or need to make multiple screenshots of the same region? It happens very fast that one moves the viewport around in Via, or one zooms in or out to have a quick look at some other region. But how to get back to that fixed region you wanted to have the same screenshots?

Views store the the currently viewed extent of your scenario. So you can define multiple views, e.g. one for a birds-eye perspective, one for a specific intersection, and another one for a certain corridor. It is then easy to switch between the different extents by just a few mouse clicks, or animate the transition from the current view point to another.

To define a view select menu `Views > Save Current View...`.
To change to saved view select menu `Views > Jump to > View`.
To incrementally move to a view select menu `Views > Fly to > View`.
To delete a view select menu `Views > Manage Views...`.

In the Views Manager, it is also possible to specify options how fast the "Fly to" operation works.

3.4 Presets

Presets allow you to restore the visibility and styles of multiple layers at once. Optionally, Presets also support switching to a specific View and time, as well as changing the animation speed. This allows Presets to be used to quickly demonstrate several aspects of a scenario, e.g. zooming in to an intersection showing single vehicles driving slowly past the node, or switching to a view showing a larger region and only transit vehicles during the evening rush hour.

Presets can be created and selected using the menu at the bottom of the Layer list.

4 Analyses and Interactive Queries

Many layers provide some functionality to query and analyze the loaded and visualized data. The results of such queries are typically displayed in the query section right to the visualization area. There, additional options are often available, depending on the active query.

Queries can be issued in multiple ways:

- By activating the query (clicking on the query-button) and then clicking in the visualization area, e.g. clicking on a link or a vehicle. Query-Buttons typically look like .
- By activating the query (clicking on the query-button) and then entering an argument, e.g. the link or agent id, into a search field in the query controls part.
- By following one of the query option in a query result. For this, click on the little triangles shown next to query results: .
- By a right-click in the visualization area to follow up on an existing query result.

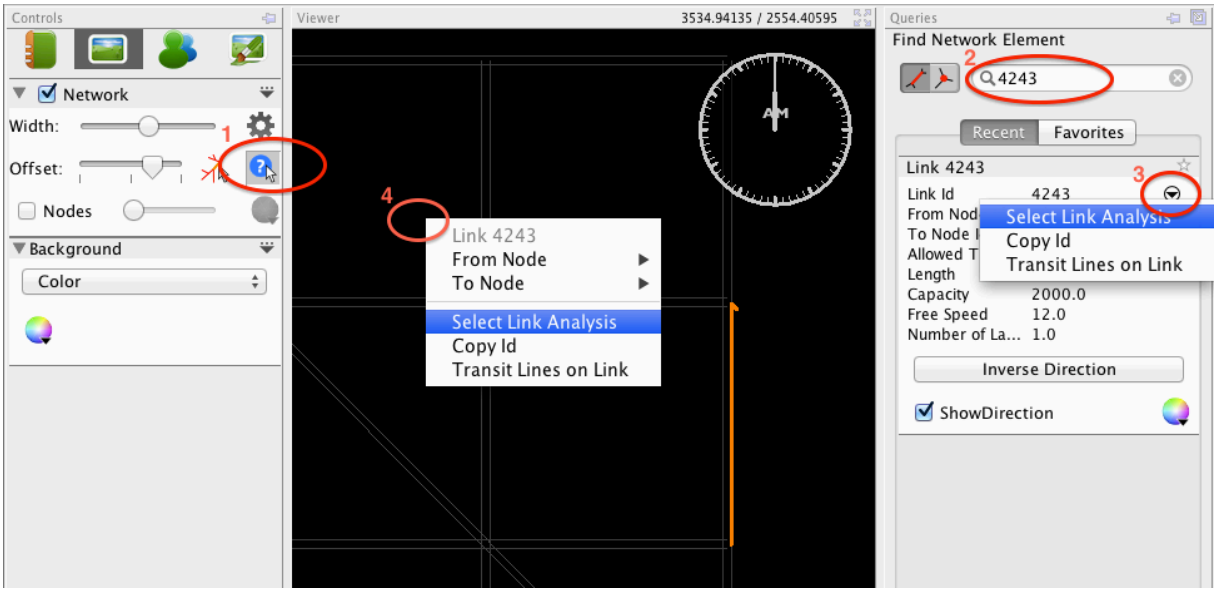


Figure 4.1: Activation of the network query and a sample query result.

Fig. 4.1 shows the several ways queries can be started:

1. By activating the query tool and clicking on a link.
2. By activating the query tool and enter the link id.
3. By clicking on a query result button and selecting a follow-up query.
4. By right-clicking in the visualization area and selecting a follow-up query.

In the following, the queries provided by the layers available in the standard version of Via are presented. Plugins may provide additional layers with queries.

4.1 Show Coordinate

This query is quite simple: It allows you to enter a coordinate's x and y values and display the coordinate's location in the visualization area. This is useful if you want to highlight a specific location, e.g. for screenshots, but don't want to create and load a coordinates files (see Sec. 3.2.9) for this. Make sure to have the "Move View" activated in the toolbar and switch to the Queries Control, where you can enter the x and y values of the coordinate.

Figure 4.2: Locate a specific coordinate

4.2 Show Agent Plan

Requires at least one of Vehicles Layer, Activities Layer

If this query is selected, one can either click on an agent or enter the agent's id and press Enter to show an agents day play. Depending on what layers are loaded, the agent's activities and/or the agent's legs are highlighted in the visualization area and listed as a query result. In the query result section, single legs or activities can be shown or hidden, to customize the presentation of the agent's (realized) day plan.

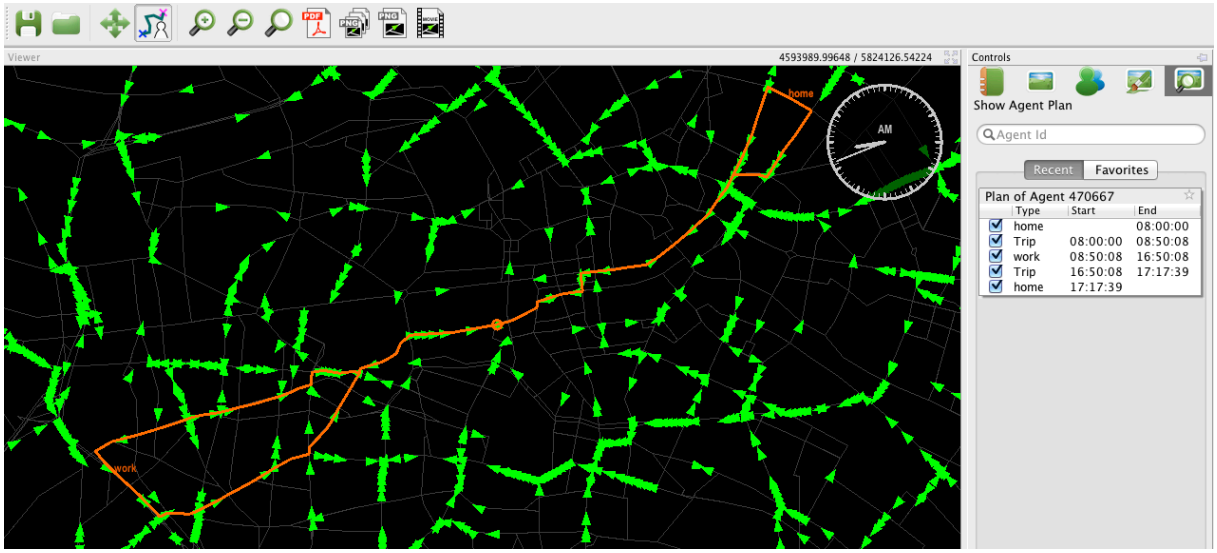


Figure 4.3: The complete day plan of one agent visualized

4.3 Find Network Element

Requires Network Layer

This query can be used to identify links or nodes in a network. It supports a direct search as well as a reverse search approach: Either you want to know where a specific link or node is located, then you enter the object's id into the search field. Or you want to know which link or node it is you see on the viewing area, then you can just click on the link or node in the viewer. To activate the query, click on the query icon ( ) provided in the network layer settings.

Once a link or node is selected, a number of additional queries are available upon right-clicking into the visualization area. Examples of such further queries are Link Volumes and Intersection Flows as presented in the next sections.

4.4 Link Volumes

The Link Volumes query shows the detailed link volumes of the selected link. It allows to aggregate the volumes into different time bins and settings a scaling factor to represent correct volumes if only a population sample was simulated.

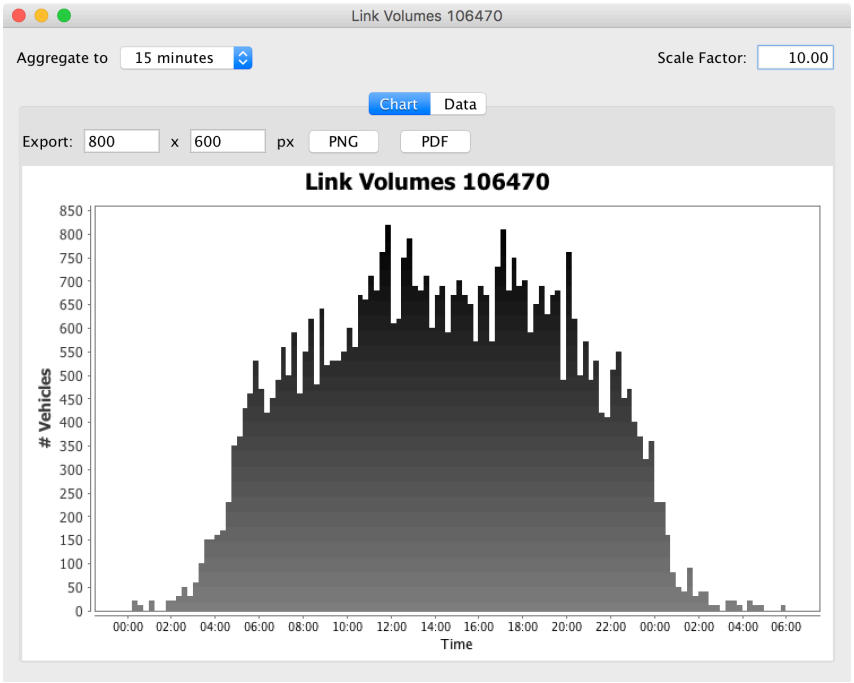


Figure 4.4: Time-dependent volumes on a selected link

4.5 Intersection Flows

The Intersection Flows query shows the number of vehicles that cross the selected node, showing the different routes the vehicles take. The query supports filtering by time, such that only the flows of a specific time frame or rush hour can be analyzed. When moving the mouse pointer over one of the flows, the volumes of only that flow will be shown on the histogram.

The lines' thickness is typically scaled such that the highest shown volume has a fixed width. This may lead to interpretation difficulties when comparing two times frames, one with a large number of vehicles crossing the node and one with a small number of vehicles crossing the node, as both might look similar. To overcome this problem, it is possible to specify a custom value as largest volume to be used for determining the scale factor of the lines.

The chart can be exported into the usual formats (PNG, PDF), but also as animated GIF. In this case, a GIF image showing the flows hour by hour is created.

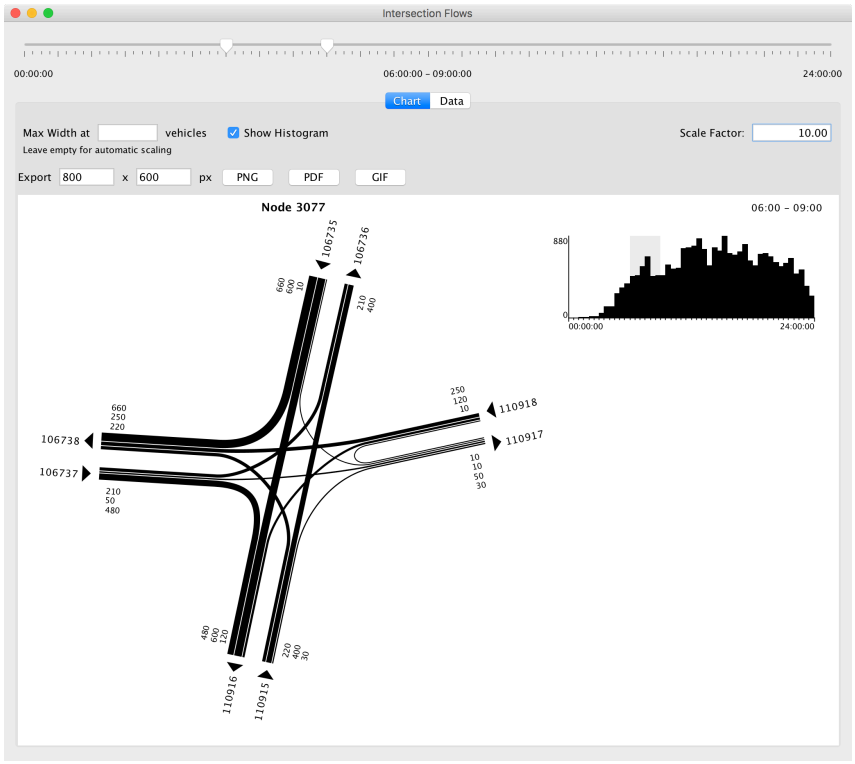


Figure 4.5: Time-dependent Intersection Flows

4.6 Select Link Analysis

Requires Network Layer and Vehicles Layer

Selecting one link for this query, it analyzes which vehicles are currently located on that link, and then highlights all links where those vehicles will travel along during their current trip or even during the whole day. Instead of all vehicles currently located on the link, the analysis period can be extended to incude all vehicles on that link in the current quarter, half or full hour or even on the whole day. The query result is dynamic: If the time changes and vehicles enter or leave the selected link, the highlighted links will change accordingly depending on the actual vehicles being on the link.

To create a Select Link Analysis, select the corresponding query tool in the network layer's settings panel and click a link. Alternatively, you can first select a link with the regular network query (see Sec. 4.3 above), and then right-click and select "Select Link Analysis".

4.7 Select Facility Analysis

Requires Facilities Layer, Activities Layer, Vehicles Layer

The Select Facility Analysis is similar to the Select Link Analysis: it shows the routes of vehicles going or coming from a selected facility. The Select Facility Analysis is available from the settings panel of the layer. After clicking on a facility, the routes of arriving agents, departing agents, or both, can be visualized.

Agents staying at the facility within the selected time frame can be put into an agent group. This allows to visualize then only those vehicles, or otherwise filter on those group.

Figure 4.6: All links travelled by agents currently located in the link in the middle are highlighted

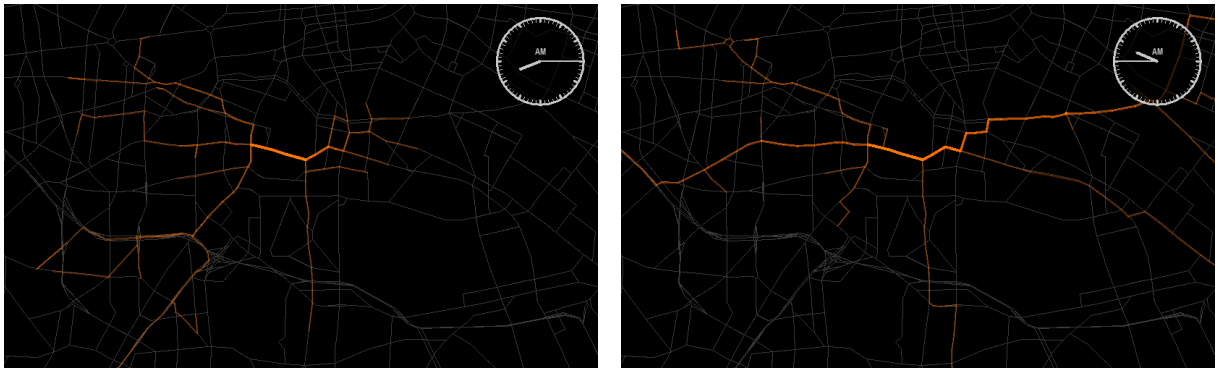


Figure 4.7: The highlighted links change as vehicles enter or leave the selected link

4.8 Facility Charts

Requires Facilities Layer, Activities Layer

If your MATSim scenario uses facilities, it is possible to analyze the number of agents arriving, departing, or being at a facility. For this, use the facility query and click on a facility. Next, right-click and select `Facility Charts...`. A new window will open as shown in Fig. 4.8 which allows you to select the different analyses and modify the charts.

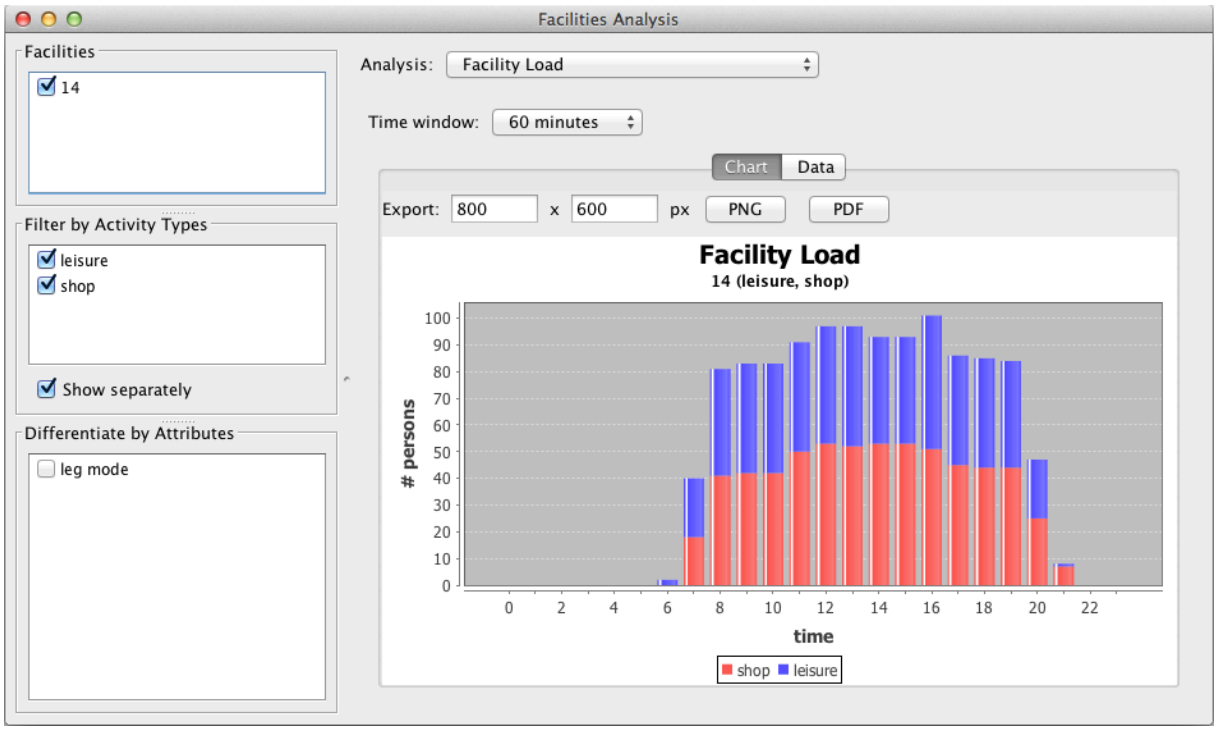


Figure 4.8: Facility Load, one of the available Facility Charts

5 Public Transport

The functionality described in this chapter is provided by the Public Transport plugin.

5.1 Overview

The public transport plugin provides many functionality for working with transit related data in MATSim. Most of the functionality is for working with MATSim's transit schedule data and the outcome from a simulation including public transport.

5.2 Layers

5.2.1 Transit Schedule

Displays transit stop facilities and transit lines.
Requires a loaded transit schedule file.

This layer displays all stop facility locations and supports many of the transit related queries with schedule data.

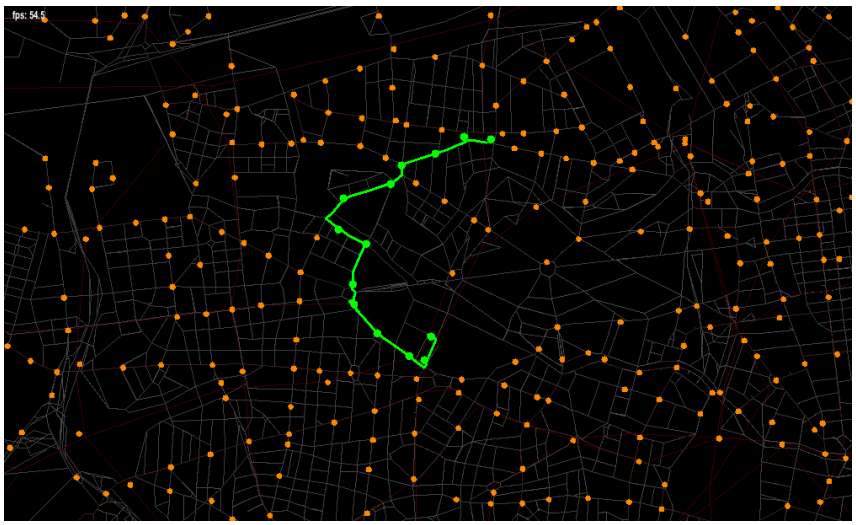


Figure 5.1: Locations of transit stop facilities and the route of a single transit line visualized.

5.2.2 Transit Stats

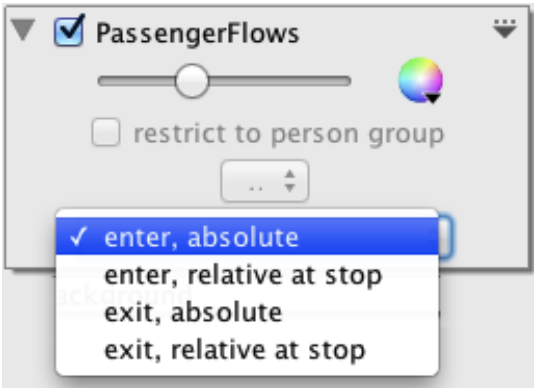
Displays number of persons waiting at transit stop facilities.
Requires a loaded transit schedule, transit vehicles, and events.
Provides data for a number of transit related queries.

The Transit Stats layers is similar to the Transit Schedule layer, but uses Events to extract simulated performance measures instead of the fixed schedule. Thus, it also displays the stop facilities, but can color them according to the number of passengers waiting at the stops. In addition, it provides data to a lot of transit-related queries.

5.2.3 Passenger Flows

Displays number of persons entering or leaving a vehicle at a stop.
Requires a loaded transit schedule and events.

The Passenger Flows layer allows to visualize the number of passengers that enter or leave a transit vehicle at a stop location, including people who change transit lines at a stop. The layer requires the information to be extracted from the simulation events. The values can be calculated either for all passengers at a stop, or only concerning a subset of agents specified by an Agent Group (see 11.2). The values are currently only available for the complete time frame covered by the events, but are not disaggregated into hourly values.



Once the events are loaded, the user can choose from 4 different settings: One can either visualize the number of passengers entering (boarding) a transit vehicle, or the number of passengers leaving (alighting) a transit vehicle. For both entering and leaving, either an absolute or relative value can be visualized. If an absolute option is chosen, the visualization scales with the absolute number of passengers boarding or alighting at the stops. Larger circles then represent more passengers. The relative options are only useful if the events were restricted to a person group during loading. Is this the case and a relative option is chosen, the visualization scales relative to the amount of the number of entering or leaving passengers in the person group compared to all passengers at that stop. If no person group was specified when loading the data, the relative values are all set to 100%, resulting in all drawn circles having the same size.

To clarify the settings, consider the following example: In your region, you have a few stops which are close to schools, universities or other educational institutes. If you just compare the absolute values without restriction to a person group, you can visually recognize which stops have the largest amount of passenger traffic. If you restrict the analysis to a person group, e.g. people aged between 15 and 20, you can recognize which stops have the highest number of student passengers. If you have restricted the analysis to the student person group and visualize the values with a relative option, you can recognize at what stop you have a high share of students. Consider you want to perform a passenger survey specific to students: It might be easier to find participants at a stop with a high share of student passengers, but not necessarily at a stop with a high absolute number of students, as at such a stop there could be even more non-student passengers, making most of the passengers irrelevant for the survey.

Tip: If the user is interested in the amount of passengers per station during a certain time of day only (e.g. only morning or evening rush hour), this can be achieved by setting a time limitation at the events data set settings. It is possible to first load the events, set to only the morning rush hour, and afterwards generate a second Passenger Flows layer and load only the events for the evening rush hour. Use the possibility to give distinctive names to your layers so you can remember which layer contains which data.

5.3 Queries

There exist several transit related queries, which are to some part dependent on each other. Starting point for most queries is the default transit query which can be activated by pressing the query button on a transit

schedule's settings panel ( ). Once this is active, transit stops can be clicked on in the visualization area, or transit lines can be looked up in the Query Control section.

5.3.1 Transit Stop

This query allows to identify stop facilities by clicking on them, or by searching for them given their id. If a transit stats layer is loaded, the query also offers statistics about the number of persons waiting at a stop location over the time of day in a chart.

5.3.2 Transit Line

This query allows one to highlight the routes of single transit lines (see Fig. 5.1 for an example). For each transit route, a number of statistics is available if a Transit Stats layer is loaded. For example, it offers a time-distance diagram to compare the scheduled travel times and the simulated travel times from stop to stop. It is also possible to show the number of passangers entering and leaving a transit vehicle for each departure of a route.

A transit line can be queried in different ways:

- The query can be activated using the button on the Transit layer settings panel, then switching to the Queries Control panel and choose a transit line from the popup menu.
- One can select a link using the network query (see Sec. 4.3) and then select an option on the query result to list all transit lines serving the selected link.
- One can select a stop, and give list all transit lines serving the selected stop.

Once a transit line and route is selected, clicking on the chart-button opens a new window with different available analyses for the selected transit route. Sec. 5.4 explains the available transit route analyses in detail.

5.3.3 Departures

Given a selected stop, one can list the next few departures at that stop, based on the current time. Alternative, having a list of transit lines serving a stop or a link, one can list the departures of specific transit routes from the list of transit lines.

5.4 Transit Route Analysis

The transit route analyses are available for each transit route. Both a TransitSchedule layer and a TransitStats layer must be loaded for the analyses to work. Some analyses also requre the Vehicles layer to be loaded. Each analysis can either be applied to exactly one departure of the selected route, of for all departures within a specific time window. If not stated otherwise, the departure time at the first stop of the route determines if a departure falls within a time window or not.

5.4.1 Passengers Entering/Leaving

This analysis shows the number of passengers entering or leaving at each stop. It also shows the number of passengers that are within a transit vehicle when it departs at a stop. If multiple departures are selected, values are accumulated.

5.4.2 Vehicle Load, Aggregated Vehicle Load

The Vehicle Load analysis shows for each departure the number of passengers in a transit vehicle when it departs at a stop. If multiple departures are selected, values are not aggregated, but shown for each single departure.

In contrast, the Aggregated Vehicle Load analysis extracts aggregated statistical values from multiple departures.

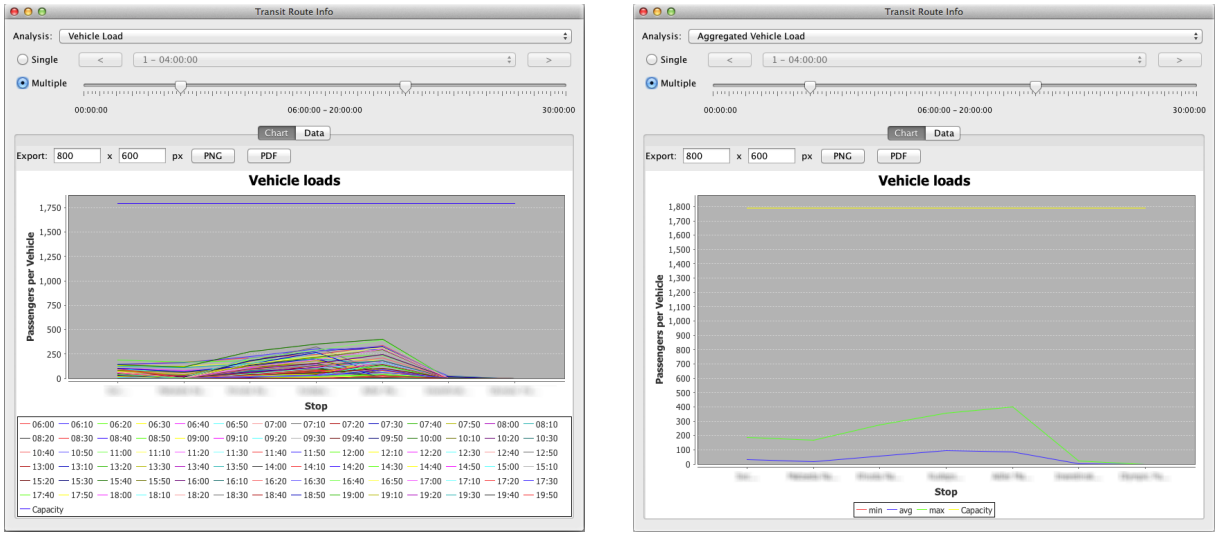


Figure 5.2: Vehicle Load per Departure, Aggregated Vehicle Load.

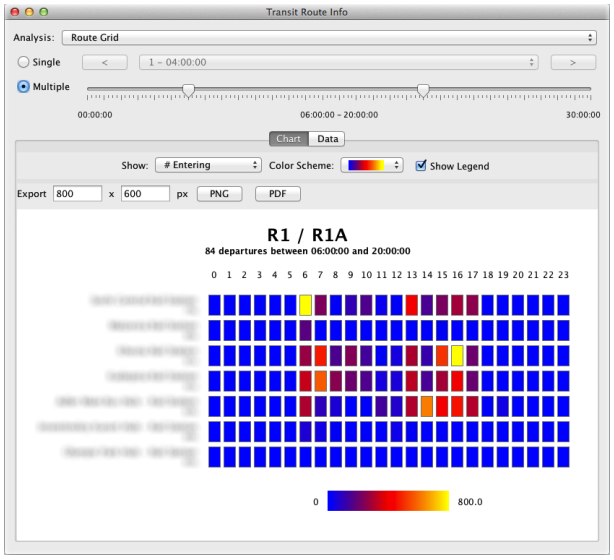


Figure 5.3: Route Grid.

5.4.3 Route Grid

The Route Grid analysis shows for each served transit stop and hour the number of passengers entering or leaving a transit vehicle of the selected transit line.

5.4.4 Route Flows

This analysis shows the flows of passengers along the transit route: It shows which parts of the route passengers travel. This analysis gives an easy overview if demand is about equally distributed along a route, if there are some hubs along the route (e.g. for feeder lines, where most people enter or leave at one specific stop), or even if a long transit route could be split into two parts without having too many people needing to switch from one line to another.

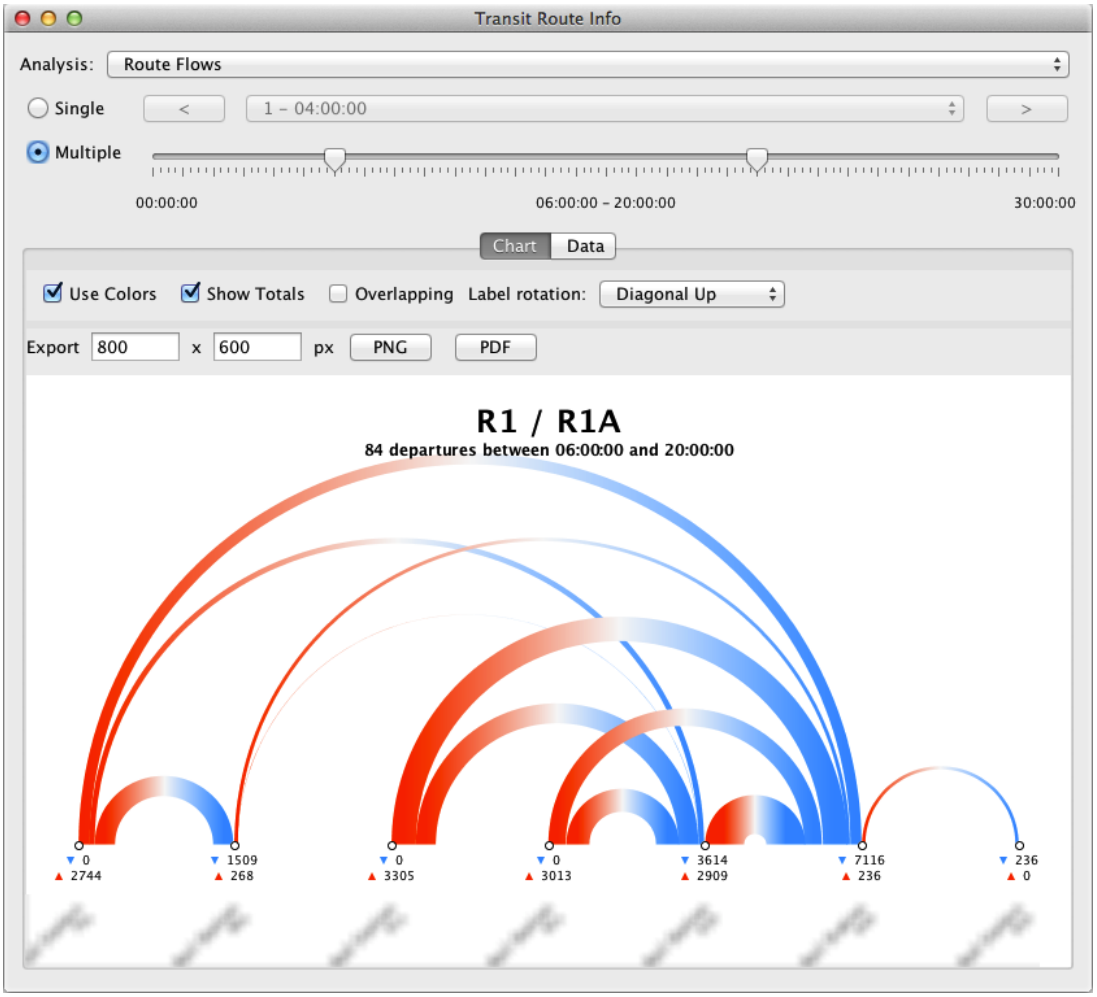


Figure 5.4: Route Flows.

6 Map Background

The functionality described in this chapter is provided by the Map Background plugin.

6.1 Overview

The Map Backgorund plugin provides several possibilities to display maps as background images.

6.2 Layers

6.2.1 GeoTIFF

Displays a raster image.
Requires a loaded GeoTIFF file.

This layer allows to display geo-referenced raster images, typically called GeoTIFF, in Via. These are pixel images where the image's edges have coordinates assigned, so they can be displayed relative to other coordinates.

6.2.2 WebMap

Displays maps from internet services.
Requires a working internet connection.

The WebMap Layer allows to display maps as backgrounds from several online sources, e.g. from OpenStreetMap, Bing or Google Maps.

Maps on the internet typically use a special coordinate projection which will be different from the coordinate system you use for your data. In order to display the correct region on the Map given your data's coordinates, you have to specify which coordinate system your visualized data is in. Just select from the menu to do so.

Please note: As mentioned, Internet-Maps use a special coordinte projection. To exactly display your data on top of such a map, computationally expensive coordinate conversions would need to be done, slowing down the visualization enormously. To overcome this problem, Via does not do any reprojection of coordinates. Instead, it only ensures that the background map and your data are exactly positioned on top of each other in the center of the visualization area. This will result in much faster visualizations, but will typically show minor differences near the edges of the visualization area, dependending on your zoom level.

7 Car Counts

The functionality described in this chapter is provided by the Car Counts plugin.

7.1 Car Counts Layer

Displays comparisons between simulated and real-world traffic counts.
Requires a loaded traffic counts file to visualize counting station locations. For comparisons to simulated traffic counts, an events file is required as well.

This layer allows the visualization of traffic counting station locations and perform extensive comparisons of real-world traffic counts to simulated traffic volumes. Once the layer is added, one can see the locations of the counting stations (white circles) and the links that are assigned to the counting stations. The links can show how well the simulated counts match the real-world counts with different colors. As an alternative, symbols (a "plus" or a "minus", depending on amound of simulated traffic compared to the counted traffic) can be displayed in different colors. To simplify the identification which link is mapped to which counting station, connectors can be displayed as well.

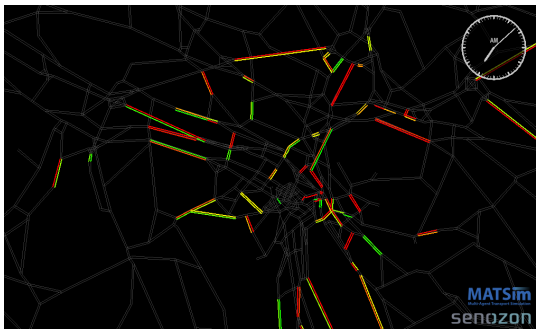


Figure 7.1: Comparisons with counting stations displayed on the counted links

If the events data is from a sampled simulation run only (e.g. a 25% sample run), the simulated counts, extracted from the events file, can be scaled by a corresponding factor (in this case: 4.0) in order to make the comparison between simulated counts and real counts meaningful.

In addition to the visualization in the viewing area, the counts data can also be analyzed using a number of charts and tables, by clicking on the "Charts" button. In the window that opens, comparisons for all (selected) counting stations or just for single counting stations can be done, typically either per hour for for the whole day. If counting stations are outside the study area, or are known to contain outdated or wrong data, they can be excluded from the analyses by unticking them in the list.

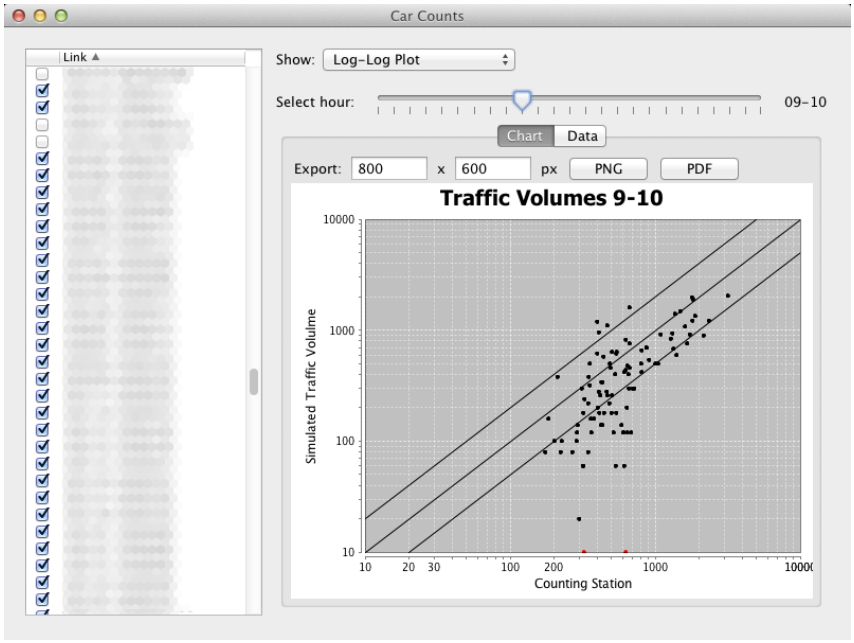


Figure 7.2: Comparisons with counting stations as charts

8 Aggregator

The functionality described in this chapter is provided by the Aggregator plugin.

8.1 Overview

While one of MATSim's strength—due to its agent-based nature—is its handling of disaggregated data, for the understanding and presentation of results, aggregated data has still some advantages. The Aggregator plugin helps in such situations as it allows to aggregate arbitrary geographical data into arbitrary regions or zones. Alternatively, it also supports aggregating data into origin-destination relations.

Data sources for the aggregation can vary. The most flexible approach is using custom XY data (see Sec. 3.2.9). Alternatively, some layers in Via serve as a data source as well, e.g. activities or facilities.

8.2 Aggregating Point Data

To aggregate and analyze point data, create a new layer of type `Aggregation Analysis`. Click on `Data` to select the data source and configure the type of aggregation. The configuration is split into 3 parts:

1. Selection of the data source, e.g. an XY data set, activities, facilities or some other available data
2. Optionally filtering the data
3. Type of aggregation, e.g. count, minimum/maximum value, etc

Click on `Zones` to configure in what geographical space the points should be aggregated into. Available aggregation spaces are:

1. Square grid
2. Hexagonal grid
3. Arbitrary shapes. Requires a loaded shape file.

Fig. 8.1 shows an example of some GPS traces being aggregated into hexagonal zones, resulting in a density map of the GPS observations.

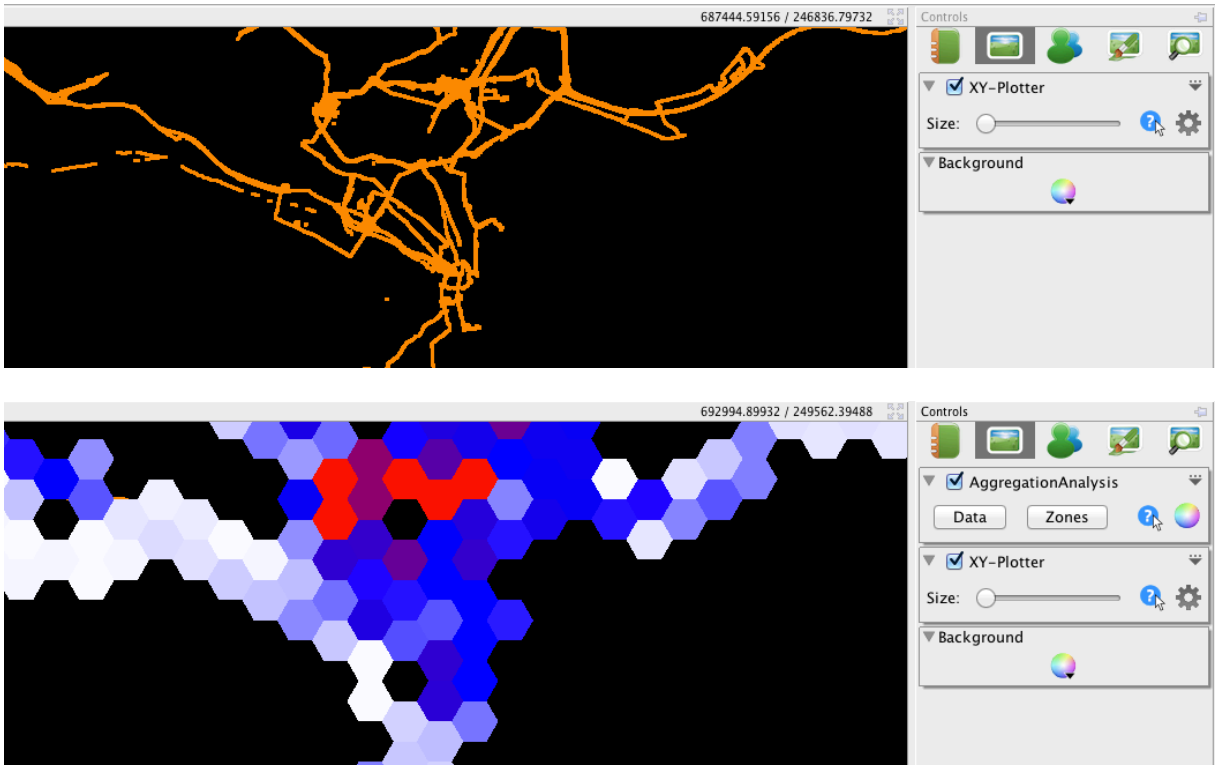


Figure 8.1: Aggregation of GPS data into hexagonal zones for a density map.

8.3 Aggregating OD Data

Sometimes, one is interested in aggregated movements, e.g. the number of trips from one region into another one. Create a new layer of type `OD Aggregation Analysis` to perform such aggregations. The configuration of the aggregation is very similar to the one of the point data aggregation, except that you might have to specify a second pair of x/y coordinates for the aggregation to work.

When visualizing the results, this layer differentiates between incoming and outgoing data per zone. In the case of trips, this relates to trips ending or trips starting in a specific zone. When quering a zone with the corresponding query zone, the incoming/outgoing values always relate to the selected zone. In the example shown in Fig. 8.2, trips are aggregation, leading from one zone to another zone. Only incoming relations are visualized, "incoming" relative to the selected zone (the one with the yellow border). The colors of the visible zones represent the amount of trips that originate in those zones and that are "incoming" at the selected zone.

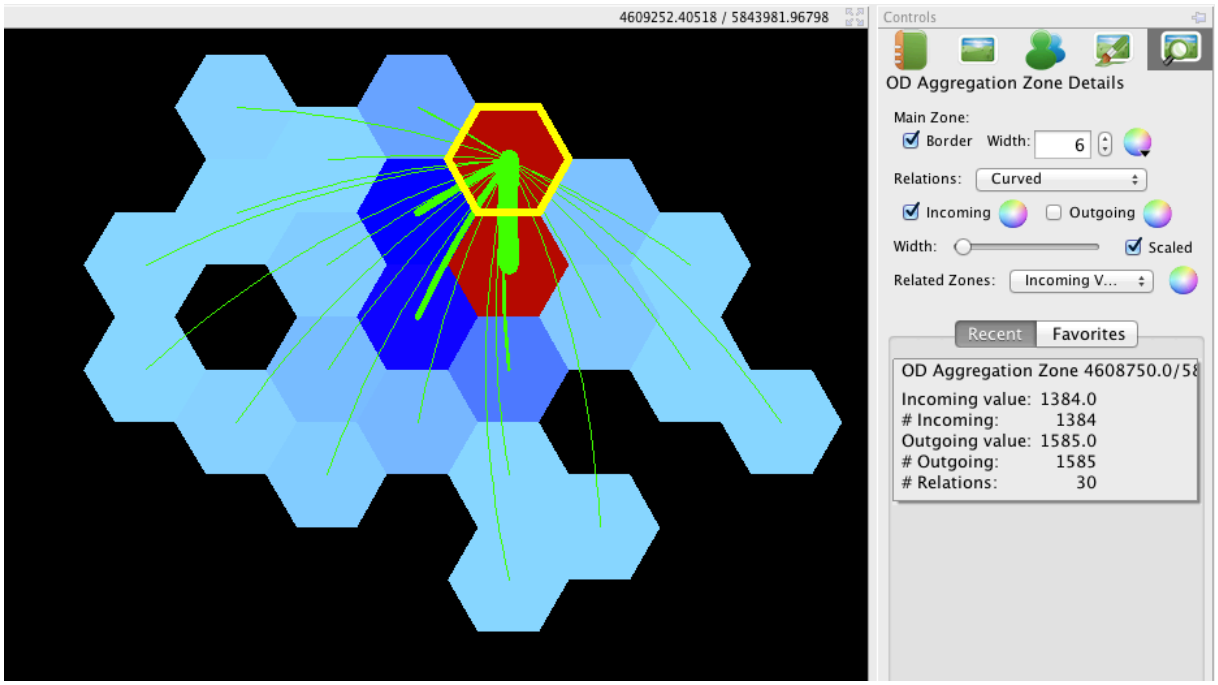


Figure 8.2: Aggregation of trips into relations between hexagonal zones.

9 Recording Movies

The functionality described in this chapter is provided by the optional Movie Recorder plugin.

9.1 Overview

Via includes many functionality to visualize MATSim simulation results in a time-dependent manner. Instead of presenting a multitude of screenshots from different times, why not just show the evolving traffic patterns in an animation, as a movie? The Movie Recorder plugin allows to record movies of Via's visualizations.

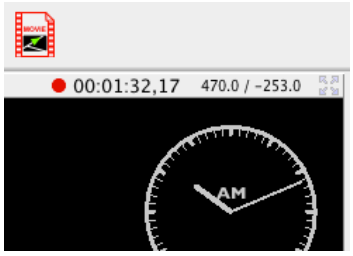
9.2 Creating Movies

Via offers two ways to create movies from its visualizations: Directly record what is shown by Via into a movie file, or first create a series of screenshots and encode those images afterwards into a movie file.

The recording of a movie will slow down Via notably, especially if a high-quality encoding was chosen. It is thus recommended to first only record a series of screenshots, and convert the images to a movie afterwards. This allows to run the movie-encoding on its own while not interacting with Via, and especially allows to re-encode the same image sequence into movies with different settings.

9.2.1 Recording a Movie

To record everything Via displays as a movie, press the `Record Movie` button in the toolbar or select `Record Movie` from the `Tools` menu. The movie recording process is started, and a movie with pre-set settings is created.



While Via is recording, the button in the toolbar changes to red. In addition, the play length of the resulting movie is shown in the title bar of the viewer area.

To stop the recording, just press the button in the toolbar again, or select `Stop Recording Movie` from the `Tools` menu. The final movie file will—by default—be stored in the directory of the Via executable, although this location can be changed in the program's options.

9.2.2 Movie Settings

The format of the movie, the default location to store it and other options can be specified in the program's options. Open Via's Options (menu `File > Options...` on Windows and Linux, `Via > Preferences...` on Mac OS X) and switch to the `Movies` tab.

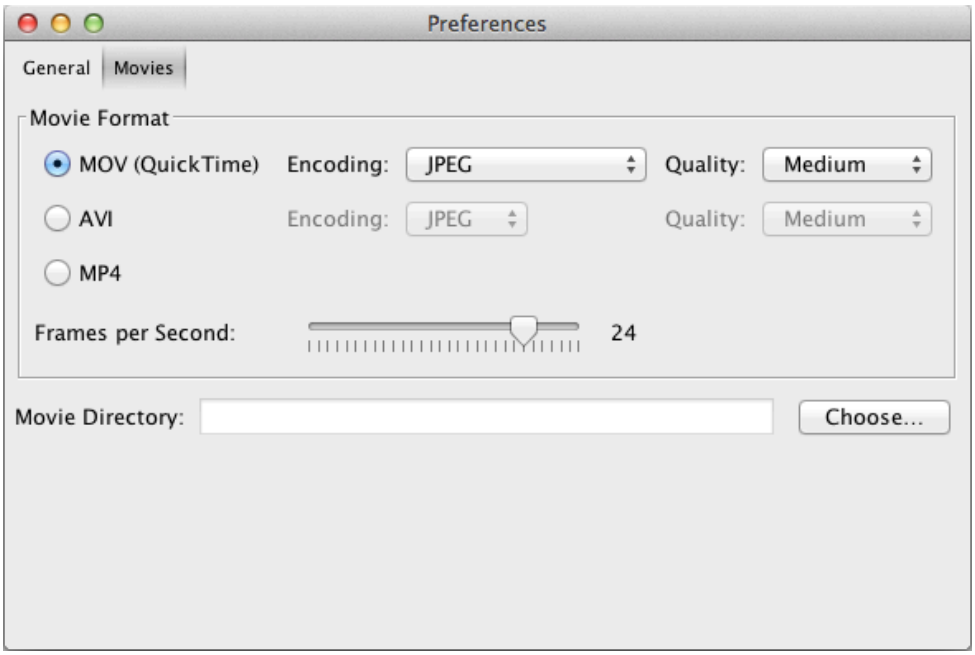


Figure 9.1: Setting the defaults for recording movies

The available settings include a choice of the movie file format (for a detailed discussion of the different formats, see Sec. 9.3), the playback speed of the movie (frames per seconds), and the directory, where the finished movie will be saved to. If the movie directory is empty, movie files will be stored in the directory of the Via executable.

9.2.3 Converting Images to a Movie

To convert a series of previously recorded screenshots into a movie, select menu `Tools > Images to Movie...`. A dialog as shown below appears.

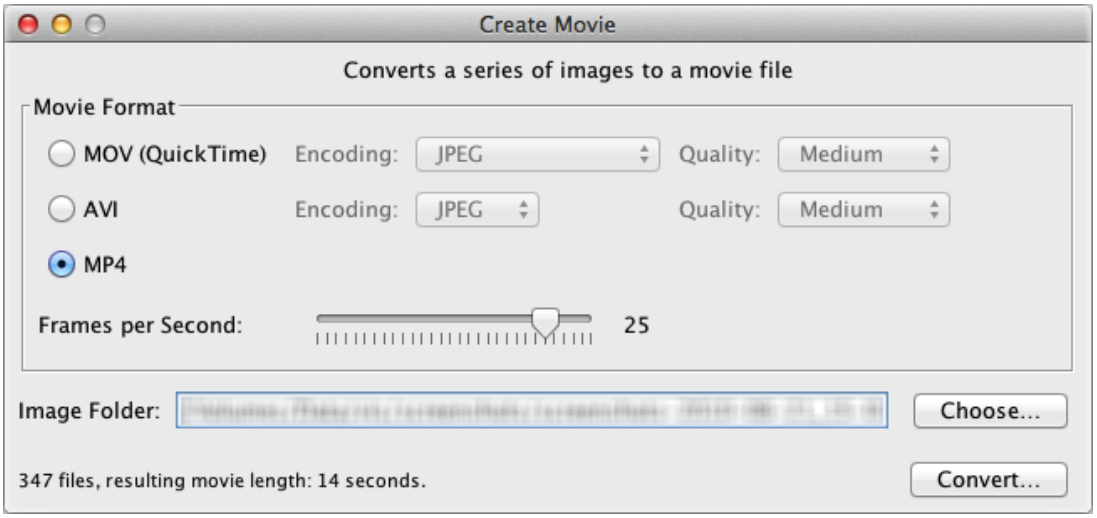


Figure 9.2: Settings for converting a series of images to a movie file

Select the desired encoding of the movie (also see Sec. 9.3 for more details about the formats), and the number of frames per seconds. Next, choose a directory containing all the image files you want to convert into a movie. Alternatively, you can drag and drop a directory from your file system onto the dialog. Via analyzes the images and calculate the expected length of the resulting movie with the current settings.

9.3 Movie Formats

Via currently supports the following movie file formats:

MOV A format traditionally used by Apple for its QuickTime software. Can nowadays also be played be Windows Media Player or other video player software.

AVI A generic video file format which can be played by most software.

MP4 Also known as H.264 or AVC (Advanced Video Codec), this is a relatively new video file format, but well supported by many software video players.

GIF Animated GIFs are image files that contain more than one image and which are typically on top of each other, showing a new image every second or so. Being a rather old file format, it is well supported by Web browsers and presentation software, but produces rather large files and only support a limited number of colors.

MOV and AVI both support different encoding of the actual video frames, either as JPEG or as PNG.

Which format should you use? Not all video players play all formats, not all presentation software supports embedding of all formats. So you have to try out which formats works best in your environment. The following findings might help you decide upon a format:

- MP4 produces high-quality videos with acceptable file sizes, but the encoding is very slow.
- MOV or AVI with PNG encoding produces high-quality videos with acceptable file sizes. Encoding is faster than MP4.
- MOV or AVI with JPEG encoding allows one to specify the quality of the images, and has the fastest encoding. Depending on the chosen quality, the size of video files varies. Note that video files encoded with high-quality JPEG produces videos with a visual quality similar to MP4 or PNG-encoded MOV/AVI, but with a much bigger file size.

If you work regularly with video files, it might be useful to look into dedicated video software to re-encode the generated video files with improved video codecs. They can often generate much smaller video files with the same perceivable quality. Also, you might want to cut multiple videos using some video editing software to combine multiple recordings into one movie, add titles and transitions, to provide a full-fledged video for your audience.

10 Scripting Via

The functionality described in this chapter is provided by the optional Scripting plugin.

10.1 Overview

The Scripting plugin provides functionality to automate certain steps in Via. This could be loading data, creating layers, setting layer options, changing views etc. In addition, the plugin provides an editor to edit and run scripts. Scripts can be written either in Javascript (the preferred scripting language), or in Jython, a variant of python that runs within Java.

10.1.1 Script Editor

The Script Editor can be opened using the entry in the `Tools` menu. A window similar to the one shown in Fig. 10.1 is opened. It provides a list of scripts on the left side (by default there is only one), and the actual editor area on the left side.

To add more scripts, the "Plus"-Button can be pressed. By default, it creates a new script using Javascript. To create a Jython script, click the little triangle next to the plus symbol and select `New Jython Editor`".

Scripts can be renamed by double clicking on the script name in the list on the left side, or deleted by clicking on the close-symbol (x) next to the script name.

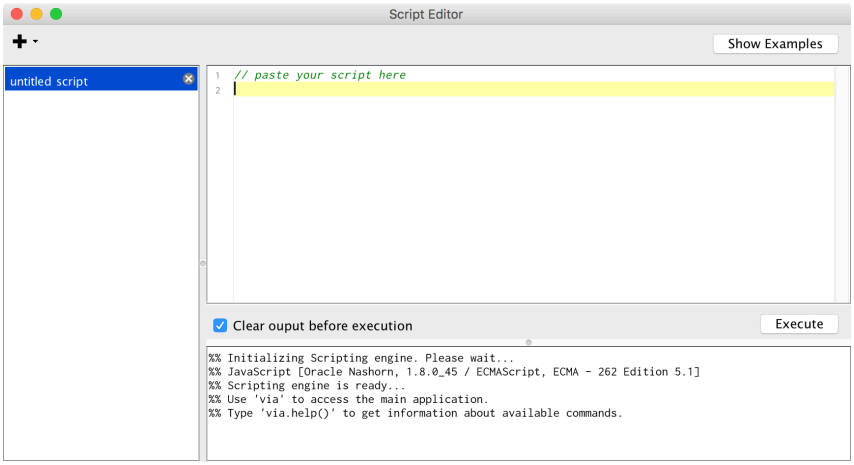

Script Editor
Show Examples
untitled script
// paste your script here
Clear ouput before execution
Execute
%% Initializing Scripting engine. Please wait...
%% JavaScript [Oracle Nashorn, 1.8.0_45 / ECMAScript, ECMA - 262 Edition 5.1]
%% Scripting engine is ready...
%% Use 'via' to access the main application.
%% Type 'via.help()' to get information about available commands.

Figure 10.1: The Script Editor

Instead of lengthy API documentation, Via provides short examples and code snippets that show you how to automate certain tasks in Via. To access the examples, press the `Show Examples` button in the upper

right corner of the Script Editor window. A floating palette will appear, providing examples on a variety of topics (see Fig. 10.2).

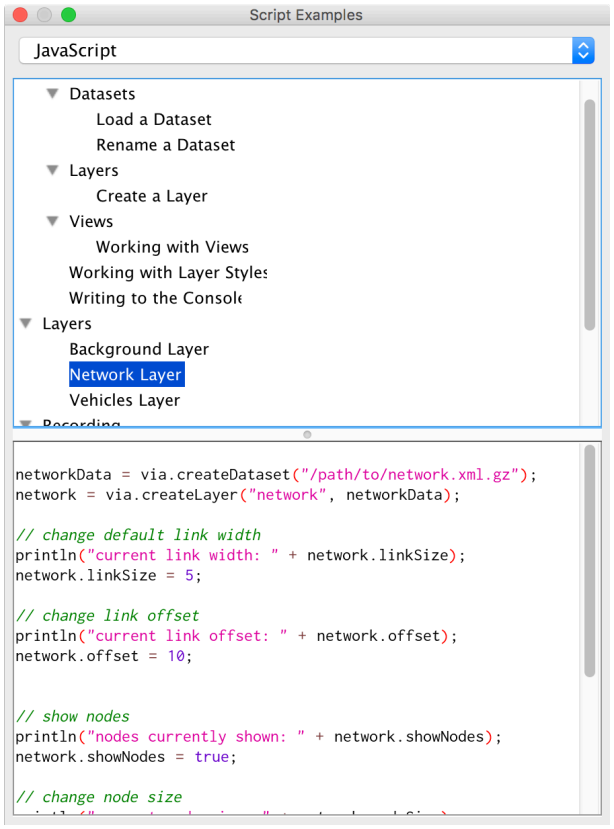


Figure 10.2: The Examples palette shows many different script examples

The following is an example script, loading some files, creating layers and saving a few screenshots at different times of day:

```
networkData = via.createDataset("sampleData/network.xml");
eventsData = via.createDataset("sampleData/10.events.xml.gz");

network = via.createLayer("network", networkData);
vehicles = via.createLayer("vehicles", networkData, eventsData);
activities = via.createLayer("activities", networkData, eventsData);

vehicles.loadEvents(); // this also loads the events for activities

via.sleep(1000); // give via a short amount of time to set up initial view

via.time = "08:00:00";
via.view.zoomTo(100, 100, 4800, 4300);

via.saveScreenshot("eight_oclock.png");

for (i = 0; i < 10; i++) {
  via.time = 7*3600 + i * 60*5; // proceed in 5min steps
  via.saveScreenshot("example_" + i + ".png");
}
```

11 Common Steps

11.1 Optimizing Events loading

Loading huge event files can take up large amounts of memory, besides that it may take several minutes to perform. If you already know that you're only interested in the morning hours, or you just want to quickly test something out, it might be useful to shorten the events file in order to reduce the amount of data that needs to be processed. Even for large scenarios, it's often enough to just start with loading 4-8 million events to get a first impression and to observe how much RAM is used, before loading larger events files.

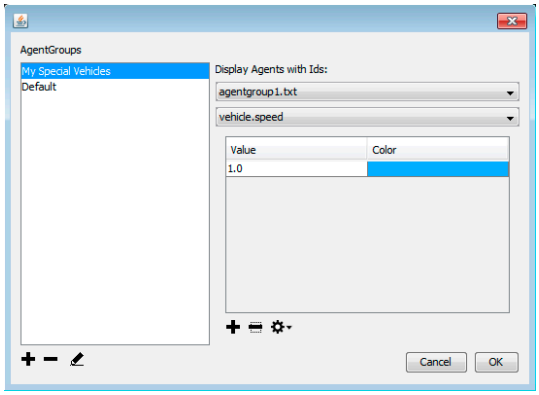
To create shortened event files, you can use the following command on Linux:

```
gzcat events.txt.gz | head -n 4000000 | gzip > events-sample4m.txt.gz
```

This command also works with xml-events, as Via will gracefully handle the misisng end-tag in the XML structure.

11.2 Color some vehicles differently

The provided sample data contains all required data and example files to follow these instructions.



Sometimes, one is interested in a few special vehicles or agents and wants to display them in another color than the rest. This could be used the highlight the vehicles of a certain bus line, show cabs in a different color, or just show the vehicles belonging to drivers with specific demographic attributes differently. Such functionality is possible with the help of Id Sets in Via. First, prepare a simple text file containing the ids of agents that should be shown differently, each id on a separate line. Next, switch to the Agent Groups panel ( ) in the Controls section and read in that file, by choosing `Read from File` in the `Select Source` menu. Switch to the Layers panel ( ), and add a Vehicles layer (if not already added). Click on the color wheel to change the colors for the vehicles.

Add a new Agent Group in the dialog by clicking in the green plus-button, and give it a name. Then, select the previously read-in Id Set for `Display Agents with Ids:` and set the colors to your likings. After clicking okay, those vehicles whose ids match the ones in the given file are colored according to their own rules.

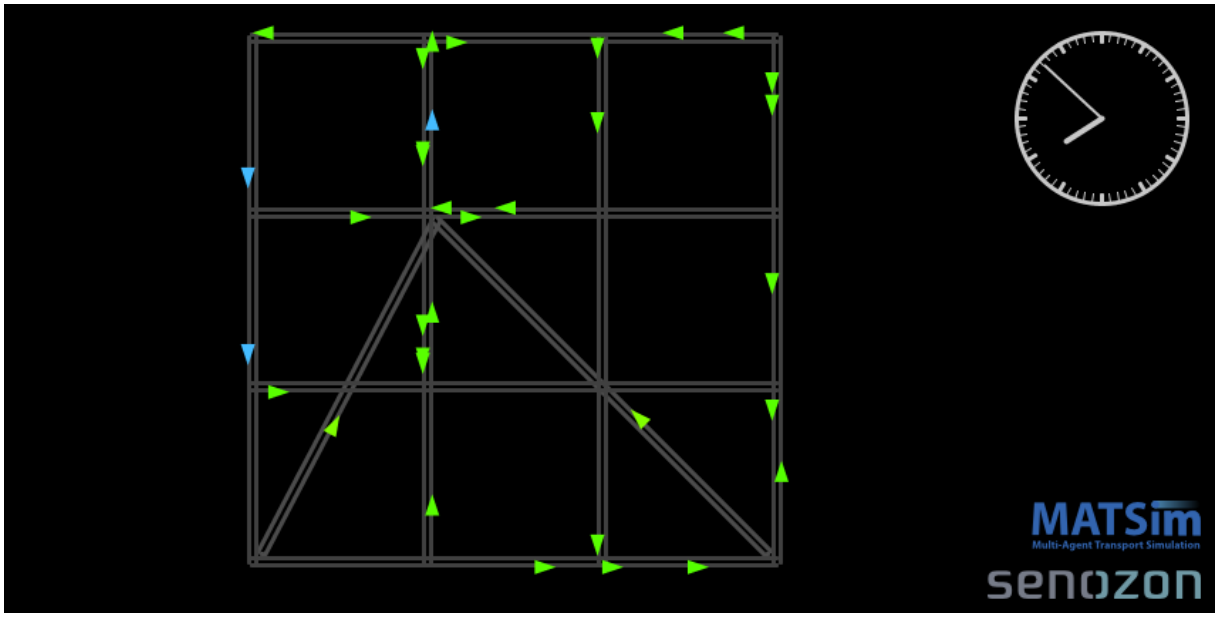
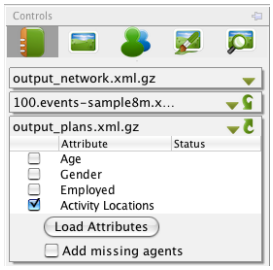


Figure 11.1: Some vehicles are colored differently, based on their association to a list of ids

11.3 Distribute activity locations to actual coordinates



When activities are loaded from an events file, it's only known on which link an activity takes place. But the events do not contain any more detailed information, especially no coordinate. This way, all activities are displayed at the end of links, often multiple activities on top of each other, making them hard to distinguish.

If you have a matching population file available, you can "enhance" the activity data with the exact coordinates from the population file. To do this, switch to the Data Sources panel in the Controls section, and add the population file. A small table will appear giving you options to load several attributes from the population file, among them the activity locations. Check it, and click on "Load Attributes". The loading may take some time, but afterwards the activities are displayed in a likely more meaningful way.

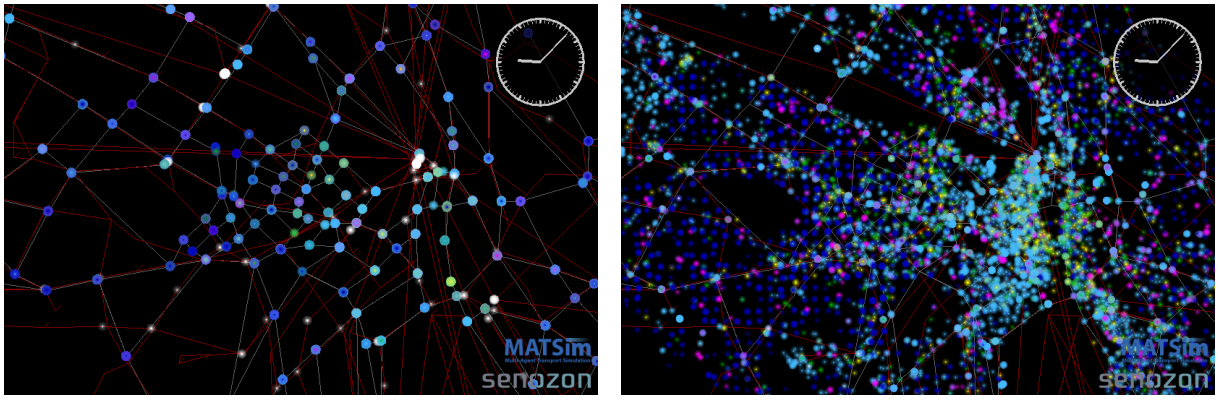


Figure 11.2: Activities, before and after loading the detailed coordinates

11.4 Customizing the list of available Coordinate Reference Systems

When loading Shape files known from GIS applications (Sec. 3.2.8), it may happen that the shapes are displayed distorted or at a wrong location. This is often due to the fact that the shapes' coordinates do not match those of the network or other coordinates used in MATSim data. When loading Shape files, it is thus possible to transform the coordinates in the Shape file to another coordinate reference system. The list of available coordinate systems to transform from/to can be customized in Via's preferences (on Windows and Linux: menu `File > Options...`, on Mac OS X: menu `Via > Preferences...`).

To add another coordinate reference system (CRS), open the Options dialog and click on `Add...` next to the list of known coordinate reference systems. In the newly opened dialog, enter a name for the to-be-defined coordinate system and then enter the description of the coordinate system. As description, Via understands either an EPSG code in the form `EPSG:4326` or a so-called "well-known-text" (WKT) description of a CRS. A good reference for coordinate reference systems is `http://spatialreference.org/`, where you can find the EPSG codes or WKT of a large number of coordinate reference systems worldwide.

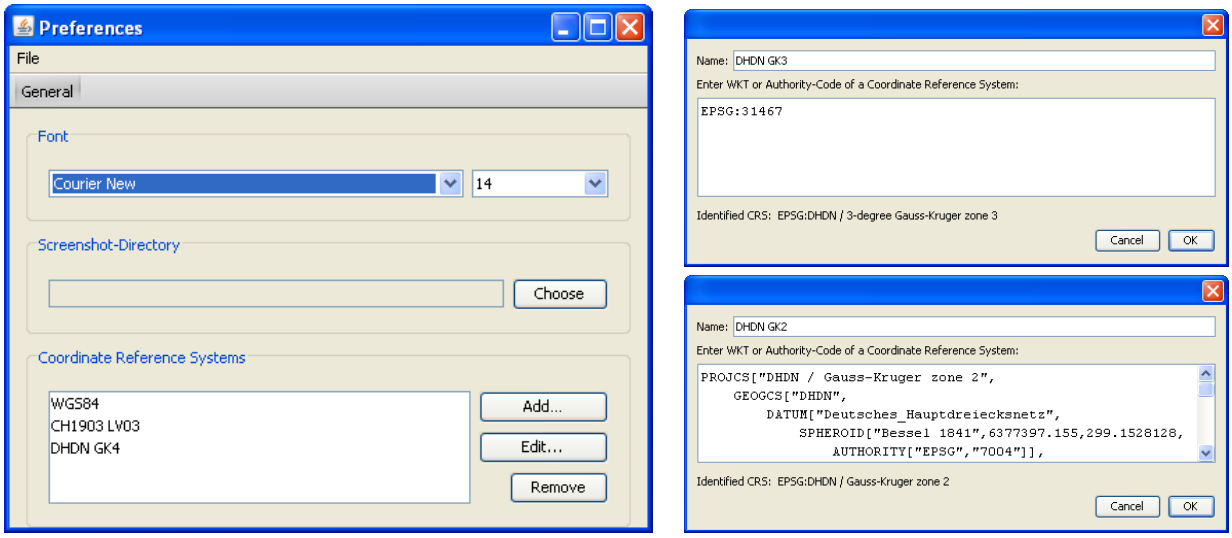


Figure 11.3: The application preferences lists the defined coordinate reference systems. Additional ones can be defined either using an EPSG-code or a "well-known-text"-description.

Appendices

A

Configuration

A.1 Change the RAM-Limit

Java applications need to have a limit set, how much memory they can use. To change this limit (e.g. to load bigger scenarios), proceed as follows.

- On Windows: open the file via.ini (or via64.ini for the 64-bit version) in a text editor and change the corresponding values.
- On Mac OS X: right-click on the Via application, and choose "Show Package Contents". A new window should open. Open the file Contents/Info.plist by double-clicking on it. Change the VMOptions in the Java-section to reflect other memory settings.
- On Linux: open the `via` shell script in your favorite text editor. Search for the line that starts with `JOPTS=`, and change the settings to your requirements.

A.2 Switch between 32-bit and 64-bit versions

- On Windows: "via.exe" is a 32-bit application, while "via64.exe" is 64-bit. Start whichever is more appropriate for your system.
- On Mac OS X: Via 1.5 is only available as a 64-bit application.
- On Linux: the starter shell script will use whatever JVM is installed on your default path, or where `JAVA_HOME` points to. Change your path or `JAVA_HOME` to either point to a 32-bit or 64-bit JVM depending on your needs.

A.3 Setting Colors based on Attribute Values

Via allows in many places to set colors based on attribute values, e.g. for vehicles or transit stops. The way the colors can be set depends on the type of attribute values, whether they are numerical values or not.

For non-numerical values, a pattern-matching approach is available where the asterisk ('*') acts as wild-card character, matching any number of any other characters. This can be used for example to match any link in a network containing the mode `walk` by using the pattern `*walk*`.

For numerical values, different colors can be assigned to specific values. Then, for values inbetween, the color can either be interpolated or not. If the colors are not interpolated, the specified values typically act as the lower boundary for the color specified, only with the exception of the smallest value whose color is also used for values smaller than it.

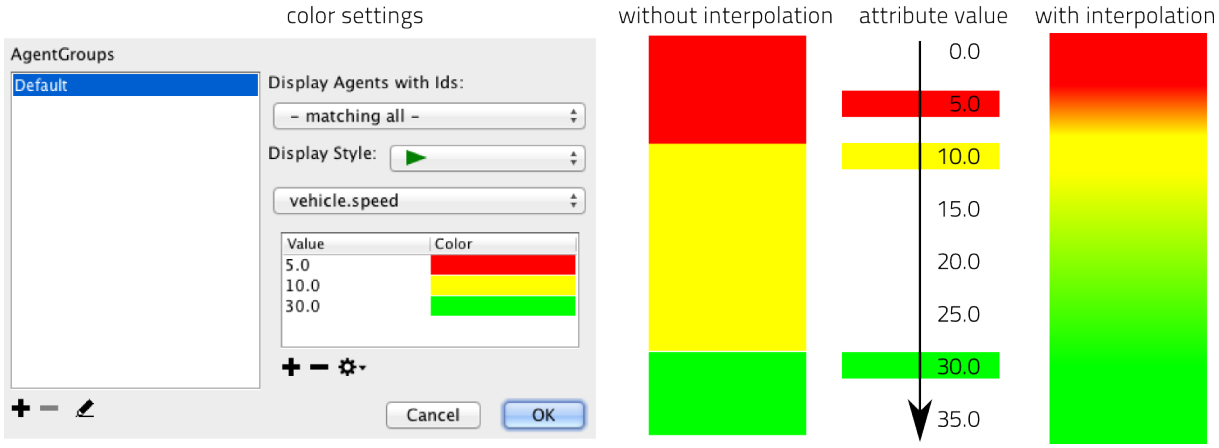


Figure A.1: Colors used depending on values are interpolated or not.

B

What's new in Via 1.6?

Via 1.6 brings the following major new and improved functionality:

Link Labels Network layers can now display labels along the links, showing any link attribute's value.

Intersection Flows Find out how many vehicles make a right or left turn at an intersection, and at what time. See Sec. 4.4.

Network Router Find the fastest route through the network.

Time-Dependent (OD) Aggregator Easily create dynamic aggregations that update themselves over the time of day.

Transit Stop Areas Due to modelling reasons, often multiple transit stop facilities are on top of each other. Easily aggregate them now to visualize the values of the stop areas, instead of a single transit stop.

Presets Restore multiple layer styles along with a view and optionally time and speed. Great for showing different aspects of a scenario during a presentation.

Voronoi cells for XY Layer Instead of just showing points in an XY Layer, it is also possible to show all the area that is closest to a shown point – the so-called Voronoi cell.

Scripting A brand new plugin that allows you to automate some steps in Via. Easily load data, create layers, set styles, save screenshots and export analysis results fully automated.

In addition, the following new and improved functionality also exists in the latest Via version:

Improved User Interface The user interface has been standardized and simplified while offering more options in many places.

Improved Network Display Besides link labels, links can now be displayed using varying transparencies.

Link Volumes The link volumes for a single link can now be shown as a chart showing the volume over the time of day. See Sec. 4.4.

Faster Display of Facilities and XY Layer Facilities Layer with many facilities, and XY Layer with a high number of points, should now be displayed faster.

Movies as animated GIF When converting a series of images to a movie, "Animated GIF" is available as a new format.

Improved Transit Stop Query The Transit Stop Query now shows a lot of information that had to be queried separately before.

Improved Car Counts Query When querying car counts, a small chart showing the comparison is shown directly in the query result instead of opening a large window, allowing for quick and easy checking of the counting stations in a region or along a route.

Time input Time data, formatted as HH:MM:SS.sss, is now supported in many places that accept numeric values.

Activity chain analysis The activity chain analysis shows you which activity chains are performed how often by the agents.

Improved Network export Network Export now supports many different options, including exporting only the currently visible area of a network.

Zoom to Layer Each layer now has an option "Zoom to Layer" to automatically change the current view to fully show the selected layer only.